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***Alloglossura*, a new subgenus of the orchid bee genus *Euglossa* (Hymenoptera: Apidae), with a review of the included species**

By

ISMAEL A. HINOJOSA-DÍAZ^{1,2,3} AND MICHAEL S. ENGEL¹

¹ Division of Entomology, Natural History Museum and Department of Ecology and Evolutionary Biology,
1501 Crestline Drive, Suite 140, University of Kansas, Lawrence, Kansas 66045;
E-mail: (IAHD) hinojosadiaz@gmail.com; (MSE) msengel@ku.edu

² Department of Environmental Studies, Math and Science Center, 400 Dowman Drive, Emory University, Atlanta, Georgia 30322

³ Corresponding author

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ABSTRACT With the availability of phylogenetic hypotheses for the orchid bee genus *Euglossa* Latreille (Apinae: Euglossini), the infrageneric classification for the genus is reconsidered. One of the major findings from phylogenetic studies for the group is the paraphyly of the subgenus *Glossurella* Dressler, although an assemblage largely congruent with the “*gorgonensis*” group within *Glossurella* is consistently recovered as monophyletic with minor differences depending on morphological versus molecular inferences. Here we present a revision of this clade under the new subgeneric name *Alloglossura*. The group as here proposed consists of seven species: *Euglossa* (*Alloglossura*) *samperi* Ramírez, *E. (A.) trinotata* Dressler, *E. (A.) gorgonensis* Cheesman, *E. (A.) oleolucens* Dressler, *E. (A.) fuscifrons* Dressler, *E. (A.) nigrosignata* Moure, and *E. (A.) paisa* Ramírez. Diagnoses are provided for all of the included species, and detailed descriptions and figures are given for all except *E. (A.) paisa*. A key is provided for the identification of males. The previously unknown females for *E. samperi* and *E. fuscifrons* are described for the first time, and *E. gorgonensis erythrophana* Dressler is newly synonymized with *E. gorgonensis s. str.* A phylogenetic hypothesis for relationships within the subgenus is also presented.

KEY WORDS: Apoidea; Anthophila; taxonomy; orchid bees; Apidae; Apinae; Euglossini; corbiculate bees; phylogeny.

INTRODUCTION

Orchid bees (Euglossini) constitute one of the most interesting groups in the Neotropical bee fauna, either for their eye catching external morphological features, their behavior, or their phylogenetic significance. Of the five genera composing the tribe, *Euglossa* Latreille, with about 130 species (Nemésio and Rasmussen, 2011), is the most diverse and as such it has been subject to extensive taxonomic work, leading to the current array of six subgeneric assemblages (Dressler, 1978b, 1982; Moure, 1989). Despite the fact that some of these subgeneric groups are recognizable and sound, the lack of a phylogenetic framework and some seeming intergradations among the subgenera led Michener (2007) to eliminate all of them in a retrograde classification of *Euglossa s. l.* With the recent production of phylogenetic hypotheses for the genus based on external morphology (Hinojosa-Díaz, 2010) and DNA sequences (Ramírez et al., 2010), a review of the infrageneric classification was timely. Most notably, the aforementioned analyses recovered the subgenus *Glossurella* Dressler as paraphyletic as currently recognized, while at the same time supporting the monophyly of some of the species groups originally included within it. When erecting *Glossurella*, Dressler (1982) delineated the existence of six informal species groups, one of them referred to as the “*gorgonensis*” group, originally including *Euglossa fuscifrons* Dressler, *E. gorgonensis* Cheesman, *E. hyacinthina* Dressler, *E. nigrosignata* Moure, *E. stilbonota* Dressler, and *E. trinotata* Dressler. Additionally, *E. oleolucens* Dressler, although omitted from an explicit assignment to the group, was originally described as closely allied to *E. gorgonensis* (vide Dressler, 1978a). Two additional species, *E. paisa* Ramírez and *E. samperi* Ramírez, when originally described were mentioned to be morphologically close to *E. oleolucens* (vide Ramírez, 2005, 2006), putatively adding

them to the “*gorgonensis*” group. Here we present a revision of the monophyletic assemblage comprising most of the species originally included in the “*gorgonensis*” group, elevating this group as a separate subgenus. We describe the previously unknown females for two species, and give descriptions for all of the species for which specimens were available for personal examination and diagnoses for all included species.

ACKNOWLEDGMENTS

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MATERIALS AND METHODS

Material examined in this study is deposited in the following collections: Division of Entomology (Snow Entomological Collection), University of Kansas Natural History Museum, Lawrence, Kansas, USA (**SEMC**); Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA (**FLMNH**); The Natural History Museum, London, United Kingdom (**NHML**); National Museum of Natural History (Smithsonian Institution), Washington, D.C., USA (**USNM**); Colección de Artropodos, Instituto Alexander von Humboldt, Bogotá, Colombia (**IAHC**); Museo de Zoología QCAZ (Quito-Católica-Zoología), Pontificia Universidad Católica del Ecuador, Quito, Ecuador (**QCAZ**). The list of specimens examined is presented as a detailed description of the label data, the information for each specimen is enclosed by quotation marks (""), each label separated by double slashes (//), and each row on individual labels separated by a semicolon (;), all of this followed by the number and sex of individuals corresponding to that dataset, as well as the acronym of the collection where they are deposited.

Not all primary types of the species treated herein were available for loan, but high resolution images were provided for pertinent structures of all type material and for comparison with specimens at hand. For one species (*E. [A.] paisa*) the holotype was not available for loan (IAHC does not loan type material and we were unable to visit Colombia as part of the project) and we also lacked additional material. This was exacerbated by the fact that

each of the repositories said to hold paratypes (Ramírez, 2005) had not yet received the material. However, the original description putatively assigned the species to the "gorgonensis" group (*sensu* Dressler, 1982), and images of the holotype obtained from IAHC together with the original description provided sufficient morphological information to ascertain the subgeneric attribution of the taxon.

Information summarizing the chemical baits and floral records provided in the labels of all specimens included in this study are presented in Table 1.

Morphological terminology in general follows that of Engel (2001), Michener (2007), and Hinojosa-Díaz (2008), while some procedures for establishing metrics (e.g., clypeal protuberance) follow those of Brooks (1988). An exhaustive description was provided for one species, *E. (A.) samperi* Ramírez, with subsequent descriptions referring back to this one. The species descriptions follow the overall format for other *Euglossa* species as presented by Hinojosa-Díaz and Engel (2007, 2011a, 2011b) and Hinojosa-Díaz et al. (2011). Statements about the morphological features and distribution for any of the taxa treated are based on reviewed specimens or bibliographic information. Photomicrographs were prepared using a Cannon EOS 7D digital camera and an Infinity K-2 long-distance microscope lens. Multilayer images were produced by using the software CombineZP.

Table 1. Summary of information on chemical baits and floral records for the specimens revised for all species of *Alloglossura*.

	<i>E. (A.) samperi</i>	<i>E. (A.) trinotata</i>	<i>E. (A.) gorgonensis</i>	<i>E. (A.) oleolucens</i>	<i>E. (A.) fuscifrons</i>	<i>E. (A.) nigrosignata</i>	<i>E. (A.) paisa</i>
Chemical baits							
Beta ionone			X				
Cineole	X	X	X	X	X		
Methyl cinnamate			X				
Methyl salicylate						X	X
p-dimethoxy benzene					X		
p-methoxy phenyl ethyl alcohol		X					
Mixture of eucalyptus oil and methyl salicylate					X		
Floral substrates							
<i>Anthurium</i> sp.			X				
<i>Gongora</i> sp.			X				

SYSTEMATICS

GENUS *EUGLOSSA* LATREILLE
Alloglossura new subgenus

Key to Males of *Alloglossura*

Type species.—*Euglossa* (*A.*) *oleolucens* Dressler, 1978.

Diagnosis.—Mid-sized metallic, green to blue-green bees with slender to robust habitus; mesepisternum with shallow not contiguous punctures; mandibles bidentate in males and tridentate in females; pronotal dorsolateral angle slightly obtuse not broadened anterolaterally and with no projections; mesoscutellum strongly convex on posterior margin, long, slightly longer than half the length of mesoscutum; male mesotibia with two tufts, anterior tuft oblong, rather diagonal respect longitudinal mesotibial margin, posterior tuft sitting on a horseshoe shaped cavity, with two distinct lobes, some species with no setae on posterior lobe (Figs. 77–82); male second mesotarso-mere with anterior margin emarginated proximally; inner surface of male metafemur with distinctive convexity near trochanter joint (Figs. 11, 31, 41, 52, 62, 73); male metatibia scalene right triangular, narrow, anterior margin about 1.5 times the length of ventral margin, compressed (thinner than most other *Euglossa* s. l.) (Figs. 10, 11, 31, 41, 52, 62, 73); metatibial organ slit narrow, basal section rather small; male metabasitarsus with ventral margin slightly oblique (Figs. 10, 31, 41, 52, 62, 73); female metabasitarsus trapezoidal with narrower straight distal margin (Figs. 14, 42, 63, 74). Eighth metasomal sternum of male with lateral edges of posterior section deeply invaginated, lobes strongly projected (Fig. 18); posterior margin of apical process of gonocoxite oblique (inner-posterior corner displaced posteriad) (Figs. 20, 83–87); lateral area of gonostylar process of gonocoxite acute (somewhat pronged); spatha surface with longitudinal striae (Fig. 86); posterior margin of outer blade of penis valve proximale notched (similar as condition on *Euglossella* Moure); lateral section of gonostylus projected in a compressed blade-like shape, standing on a more or less sagittal orientation in respect to the body plane, never broadened on the inner surface to bare the dorsal setae, this last usually absent, although in some species moderately dense (Figs. 88–94).

Included species.—*Euglossa samperi* Ramírez, *E. trinotata* Dressler, *E. gorgonensis* Cheesman, *E. oleolucens* Dressler, *E. fuscifrons* Dressler, *E. nigrosignata* Moure, and *E. paisa* Ramírez.

Etymology.—The new subgeneric name alludes to the superficial similarity of some external features to species of *Glossura* Cockerell (Greek, *allos*, meaning “other”, plus *Glossura*, and effectively meaning, “the other *Glossura*”). The name is feminine.

1. Second metasomal sternum with two shallow semicircular depressions lined with setae, located midway between median body line and lateral margin of second metasomal tergum (anterior to sinuate invaginations on posterior sternal margin) (Figs. 16, 30, 54); posterior tuft of mesotibia composed of two separate setose lobes of variable sizes (Figs. 77–78, 80) 2
- Second metasomal sternum with no integumental modifications near sinuate invaginations of posterior sternal margin (Figs. 44, 65, 76); posterior tuft of mesotibia present as a unique setose unit of variable size (sometimes vestigial) (Figs. 79, 81–82) 5
2. Facial paraocular ivory marks present, well developed, triangular, lower width occupying about one-third of horizontal section of epistomal sulcus (Figs. 2, 4, 7, 24–25) 3
- Facial paraocular ivory marks absent or very narrow (lower width occupying no more than one-eighth of horizontal section of epistomal sulcus (Figs. 46, 48–50) 4
3. Mesobasitarsus with prominent, carinate elevation on distal third of inner surface (Fig. 12); mesodistitarsus with noticeable claw-like acute integumental projection on antero-distal angle (Fig. 13); green to blue-green integument with either dominant golden bronzy iridescence (Figs. 1–2) or noticeable purple highlights on metasomal terga (Figs. 3–4) (Ecuadorian Andes, mid-elevation, Pacific slope) *E. (A.) samperi* Ramírez
- Mesobasitarsus unmodified on inner surface (Fig. 27); mesodistitarsus simple, with no projection on antero-distal angle (Fig. 28); green integument with dominant golden-bronzy iridescence on metasomal terga (Figs. 23–24) (Pacific lowlands of Ecuador, mid-elevations in Colombia) *E. (A.) trinotata* Dressler
4. Posterior tuft of mesotibia with anterior lobe slender (very thin), posterior lobe tear shaped, both lobes rather contiguous, not delimited by integumental crease (Fig. 80); upper area of clypeal disc between paramedial ridges brown colored; green integument with either golden-bronzy (Figs. 45–46) or blue-green dominant iridescence (Figs. 47–48) (Costa Rica, Panama) *E. (A.) oleolucens* Dressler
- Posterior tuft of mesotibia with anterior lobe oblong, paramecium shaped, comparable in size to anterior tuft, posterior lobe round, both lobes separated by integumental crease; clypeal disc with no noticeable brown coloration between paramedial ridges (concolorous with metallic surrounding areas);

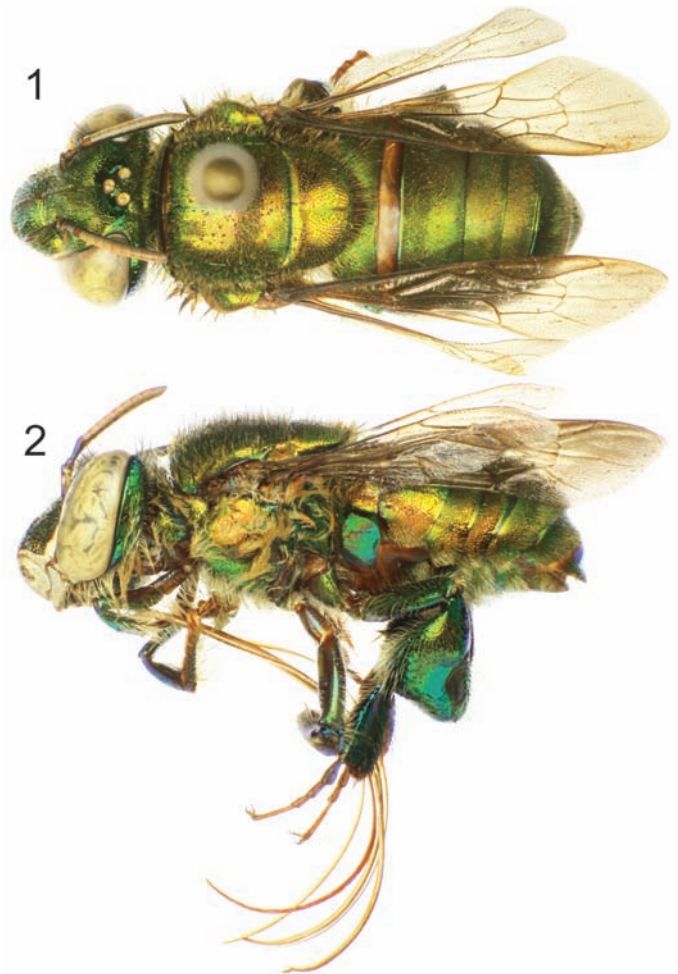
green integument intermixed with strong blue-green coloration (Colombia, Andean Cordillera Central)....

- *E. (A.) paisa* Ramírez
5. Mesotibial vestiture on outer surface reduced (Fig. 72), anterior tuft comma shaped; posterior tuft vestigial, at most present as a minute setose spot (Figs. 72, 82); mesotibia characteristically enlarged (inflated), with a much stronger build than in other species in subgenus (Figs. 67, 72); dark green to dark blue integument with purple iridescence on metasomal terga (Figs. 66-67) (Panama) *E. (A.) nigrosignata* Moure
- Mesotibial vestiture covering most of outer surface (Figs. 40, 61), posterior tuft tear shaped (Figs. 79, 81); mesotibia with regular build (Figs. 40, 61) and variable coloration 6
6. Facial paraocular ivory marks present, well developed, triangular, lower width occupying about half of horizontal section of epistomal sulcus (Figs. 56, 59); green integument with light blue-green iridescence (Figs. 55-56) (western Amazon Basin in Colombia, Ecuador, and Peru) *E. (A.) fuscifrons* Dressler
- Facial paraocular ivory marks absent or vestigial (at most present as very narrow bands along mid-upper paraocular area contiguous to compound eye) (Figs. 33, 35, 38); green integument with iridescence varying from strongly golden-reddish (Figs. 34-35) to blue green (Figs. 32-33) (Costa Rica, Panama, Colombia)....
- *E. (A.) gorgonensis* Cheesman

Euglossa (Alloglossura) samperi Ramírez
Figs. 1–22, 77, 88, 95

Euglossa (Glossurella) samperi Ramírez, 2006: 61–68 [62]. Holotype ♂ (QCAZ, photographs of type provided), paratype ♂ (SEMC, *visum*).

Diagnosis.—Labiomaxillary complex in repose surpassing tip of metasoma, in male by about one metasomal tergum length (Figs. 1–4), in female by slightly less than that (Figs. 5–6); integument coloration in male either green with dominant golden-bronzy iridescence (Figs. 1–2), or dark blue with some blue-green areas on face as well as some blue-purple highlights all over body, especially on metasomal terga (Figs. 3–4), known female of dark blue variety for male (Figs. 5–6); sulci, major sclerite margins, and inner surfaces of podites dark brown (Figs. 1–6); metasomal terga with shallow punctuation, bigger on sixth and seventh terga in male and fifth and sixth terga in female; male with paraocular ivory marks well developed, triangular, lower width occupying no more than one-third of horizontal section of epistomal sulcus, antennal scape with weak lateral ivory spot in the golden-



Figs. 1–2. *Euglossa (Alloglossura) samperi* Ramírez, male, golden-bronze morph: 1. Dorsal habitus. 2. Lateral habitus.

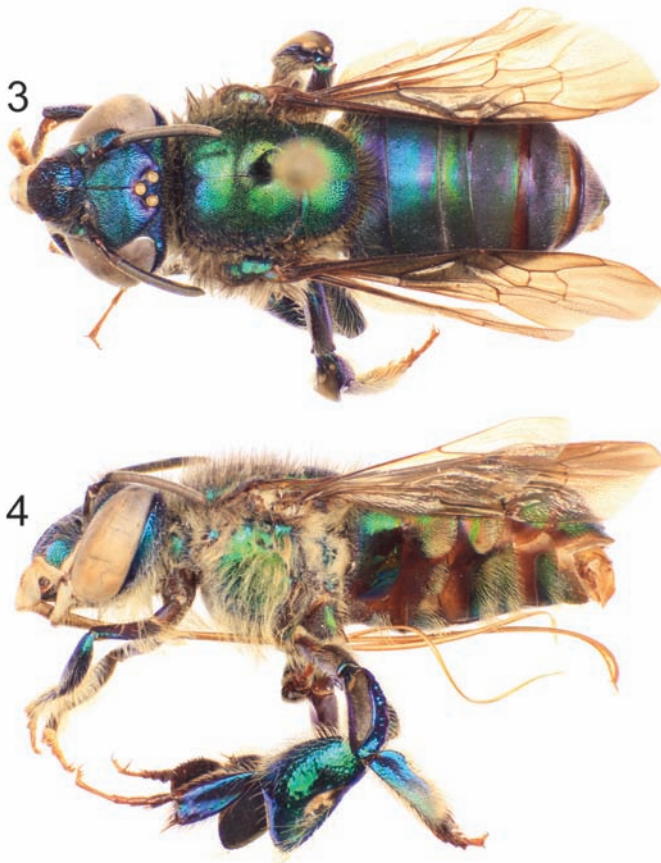
bronzy morph (Fig. 2) and no spot in dark blue morph (Figs. 4, 7); clypeal disc in both sexes with reduced (but present) brown coloration along upper half of medial ridge (Figs. 7-8); male preocular area green with purple spot on upper section (Fig. 15); lower interorbital distance narrower than upper interorbital distance, much more noticeable in male (Figs. 7-8); labrum rather square in male, wider than long in female; male with anterior mesotibial tuft oblong; posterior tuft bilobed, sitting in a horseshoe-shaped cavity, posteriormost lobe round, anterior lobe elongate, lobes separated longitudinally by a crease of integument almost as thick as anterior lobe (Figs. 9, 77); mesotibial spur present; male mesobasitarsus with prominent, carinate elevation on distal third of inner surface (Fig. 12); mesodistitarsus with noticeable claw-like acute integumental projection on antero-distal angle (Fig. 13); male metatibia with noticeable depression devoid of setae on inner surface (Fig. 11); second metasomal sternum in male with two shallow semicircular depressions, lined

with setae (Fig. 16); dorsal process of gonocoxite about as long as broad, convexly projected (thumb-like), basal incision broadly concave (Fig. 20); gonostylar lateral section broadened at base, with a dense row of moderately long setae along shallowly concave dorsal margin (Fig. 88).

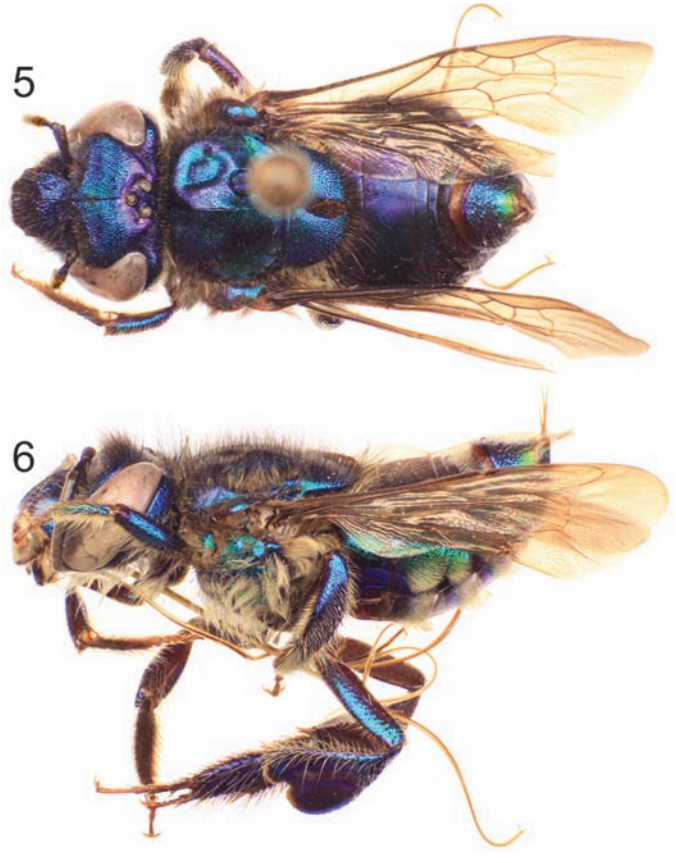
Description.—♂: *Structure.* Total body length 12.18 mm (10.96–13.56; n=5); labiomaxillary complex in repose surpassing tip of metasoma by about one metasomal tergum length (Figs. 1-4). Head length 2.74 mm (2.59–2.89; n=5), width 4.43 mm (4.30–4.58; n=5); upper interorbital distance 2.15 mm (2.07–2.22; n=5); lower interorbital distance 1.94 mm (1.85–2.01; n=5); upper clypeal width 1.13 mm (1.06–1.22; n=5); lower clypeal width 1.85 mm (1.78–1.95; n=5); clypeal protuberance 0.94 mm (0.81–1.04; n=5); medial clypeal ridge well developed, sharp, paramedial clypeal ridges well developed, especially along their lower two thirds; labrum rather square on frontal view, slightly wider than long, length 1.10 mm (1.04–1.15; n=5), width 1.14 mm (1.11–1.19; n=5); medial labral ridge sharp; paramedial labral ridges sharp, oblique, running on about four fifths of labral length; labral windows ovoid, occupying proximal two thirds of labrum; interocellar distance 0.25 mm (0.22–0.27; n=5); ocellocular distance 0.67 mm (0.66–0.67; n=5); first flagellomere almost as long [0.42 mm (0.37–0.44; n=5)] as second and third flagellomeres combined [0.44 mm (n=5)]; length of malar area 0.07 mm (0.05–0.09; n=5). Mandible bidentate. Pronotal dorso-lateral angle as described for subgenus; intertegular distance 3.36 mm (3.26–3.41; n=5); mesoscutal length 2.75 mm (2.67–2.89; n=5); mesoscutellar length 1.38 mm (1.27–1.44; n=5); mesal area of mesoscutum slightly concave; posterior margin of mesoscutellum evenly convex (Figs. 1, 3); mesotibial length 2.31 mm (2.22–2.44; n=5), mesotibial spur present; mesobasitarsal length 2.10 mm (2.00–2.30; n=5), width 0.76 mm (0.74–0.78; n=5) (as measured at proximal posterior keel), posterior keel projected in a noticeable obtuse angle, inner mesobasitarsal surface with prominent elevation on distal third topped by a carinated ridge (Fig. 12); mesodistitarsus on its antero-distal angle with a noticeable claw-like acute integumental projection (Fig. 13); metafemur with a distinctive convexity on inner-ventral margin, proximal to trochanter (Fig. 11); metatibial shape triangular (scalene right triangular) (Figs. 10-11), metatibial anterior margin length 3.20 mm (3.11–3.26; n=5), ventral margin length 2.08 mm (1.93–2.22; n=5), postero-dorsal margin length 3.86 mm (3.67–4.00; n=5), maximum metatibial thickness 0.80 mm (0.74–0.78; n=5); metatibial organ slit narrow, basal section oval, length 0.39 mm (0.37–0.41; n=5), distal section spur shaped, maximum width occupying about one-third of metatibial outer surface width (Fig. 10 metatibial inner surface with a notorious circular depression adjacent to joint with metabasitarsus (Fig. 11 metabasitarsal length

2.19 mm (2.00–2.30; n=5), mid-width 0.87 mm (0.81–0.93; n=5); metabasitarsal ventral margin slightly oblique, convexly projected (Fig. 10). Forewing length 8.98 mm (8.67–9.33; n=5); jugal comb with 13–16 blades (n=5); hind wing with 17–20 hamuli (n=5). Maximum metasomal width 4.66 mm (4.52–4.74; n=5); second metasomal sternum with two shallow semicircular depressions, lined with setae and located midway between median body line and margin of second metasomal tergum (Fig. 16).

Coloration. Two color morphs, one uniformly green with noticeable golden-bronzy iridescence all over body (Figs. 1–2), other morph with dark blue features (Figs. 3–4) as follows: Head mainly dark blue with some blue-green on paraocular areas near antennal sockets, vertex blue-purple, epistomal sulcus dark brown, clypeal disc with some bronzy-brown hue; additional head coloration features in both morphs as follows: medial ridge dark brown with some brown area along upper half, distal margin dark brown; paraocular ivory marks triangular, lower width occupying no more than one third of horizontal section of epistomal sulcus, ivory color surrounded by thin brown margin; lower lateral parts of clypeus ivory; labrum ivory; labral windows amber-translucent; malar area ivory (brown on anterior acetabular margin in blue morph); mandible ivory on outer surface, teeth and margins brown; antennal scape, pedicel and first flagellomere dark brown, remaining flagellomeres light brown on anterior surface, dark brown on posterior surface; scape with no ivory spot in blue morph (Figs. 4–7), golden-bronzy morph with small ivory (yellowish) spot on upper lateral surface (Fig. 1–2). Mesosoma and metasoma features of dark blue morph as follows (other morph uniformly green with golden-bronzy iridescence [Fig. 2]): Pronotum blue-green with coppery hue, blue-purple coloration dominant on pronotal lobe, margins dark brown; mesoscutum, mesoscutellum and tegula bottle green with blue-purple iridescence especially on anterior portion of mesoscutum, posterior half of mesoscutellum and most of tegula, all intermixed with faint coppery hue (Figs. 3–4); mesepisternum mainly green on lateral-facing surface, slightly darker on upper section (Fig. 4); preomalar area concolorous with lateral-facing area, except for a purple spot (preomalar spot) on upper-lateral area (not differentiated in green, golden-bronzy morph), otherwise blue-green (Fig. 15); metepisternum and propodeum bottle green with blue-green/bronzy iridescence; legs mainly blue-green with a mix of brown amber base color (dominant on inner surface of all segments, most surface of all proximal podites and tarsomeres beyond basitarsi) and blue-purple iridescence more noticeable on mesofemur, mesotibia and metadasitarsus (Figs. 3-4, 9-10); wings hyaline with brown veins and light coppery hue (Figs. 3–4). Metasomal terga blue-green on anterior two-thirds and



Figs. 3–4. *Euglossa (Alloglossura) samperi* Ramírez, male, dark blue morph: 3. Dorsal habitus. 4. Lateral habitus.



Figs. 5–6. *Euglossa (Alloglossura) samperi* Ramírez, female: 5. Dorsal habitus. 6. Lateral habitus.

blue purple along posterior margin, all with coppery hue (Fig. 3); sterna green with golden iridescence.

Sculpturing. Face with dense areole-punctures, sized between one-third and one-half of median ocellar diameter on clypeal disc, smaller on frons (nearly one-eighth of median ocellar diameter) and becoming elongate on anterior surface of vertex (Fig. 7). Mesoscutum with moderately dense, small (about one tenth of median ocellar diameter) punctures, separated by two puncture diameters on average, much sparser along median mesoscutal line, becoming denser and larger (comparable to those on vertex) along posterior margin; mesoscutellum on anterior margin with punctation as on posterior margin of mesoscutum, becoming larger towards posterior mesoscutular margin, some smaller punctures along median mesoscutellar depression (Fig. 3); mesepisternal lateral-facing surface with moderately dense (separated by at least one puncture diameter), shallow oval punctures slightly denser on upper area and sparser on ventral surface (Fig. 4); preomalar area with similar punctation as lateral-facing area of mesepisternum, except for the purple colored preomalar spot which has denser and

smaller punctures and a rather polished area contiguous to it (Fig. 15); metatibial punctuation moderately dense, punctures shallow, comparable in size to those on clypeal disc, becoming very sparse ventro-posteriorly, area along metatibial organ slit smooth (Fig. 10). All metasomal terga (except smooth ventrolateral areas of first metasomal tergum) with evenly dense, shallow punctuation, punctures sized similarly to those on frons, doubling in size on postero-lateral corners of all terga and on all surface of sixth and seventh terga (Figs. 1–4); metasomal sterna with punctuation comparable to that on postero-lateral corners of terga (Fig. 16).

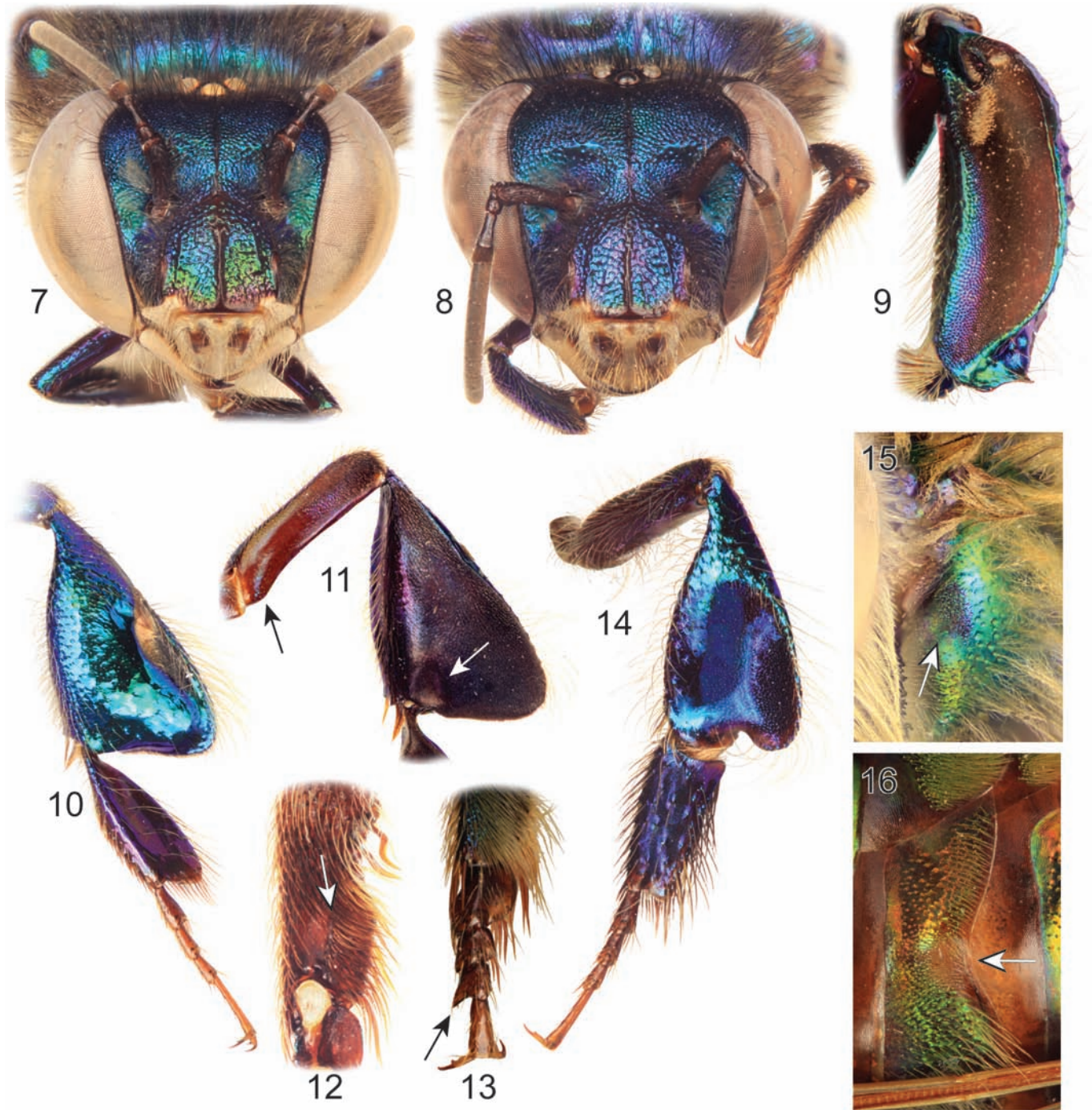
Vestiture. Frontal fringe with an arrangement of dense setae of two natures, dominant ones dusky, very minutely branched, and as long as four mid-ocellar diameters (length of antennal scape), slightly curved, others light, simple, and half as long as dusky ones; remainder of face (except as noted hereafter) with scattered setae of same nature as fringe, shorter on most areas, except along edge of clypeal disc where they are as long as on frontal fringe, labrum with light setae dominant; antennal depressions with appressed, light, plumose setae; vertex with bare ar-

eas lateral to ocellar triangle and with long (slightly longer than those on frontal fringe), dark setae in the middle of ocelli and posterior section of vertex where they are mixed with some scattered, light, plumose, short setae; gena with dense, light, plumose setae, increasing in size towards lower genal section, continuous with simpler setae along ventral mandibular margin; antennal scape and pedicel with scattered, dark, short, sturdy, simple setae, flagellum covered with dense, light, simple minute setae (Fig. 7). Mesoscutum and mesoscutellum densely setose, setae proportionally composed of two kinds, some dusky, minutely branched, long (nearly as long as those on frontal fringe), slightly curved, the others light, plumose, slightly shorter, the dusky ones becoming longer on posterior mesoscutellar margin, and the pale ones appearing simple all over mesoscutellum (Figs. 1-4); lateral-facing surface of mesepisternum, metepisternum and propodeum with, dense, pale, plumose setae as long as those on frontal fringe, some dark, sturdy long setae interspaced on pronotal lobe and upper mesepisternum; preomaular area with setae as those on lateral-facing mesepisternal areas, except bare on preomaular spot and contiguous smooth area (Figs. 4, 15); foreleg with moderately dense, fulvous setae, short overall except on posterior surfaces of protrochanter to probasitarsus, mainly plumose on protrochanter and profemur, and appearing simple on protibia and probasitarsus with dense, yellowish, sturdier setae on inner surface, chemical gathering tufts on second through fourth protarsomeres made of dense, brown-amber, moderately long, setae (Fig. 4); mid and hind legs with general vestiture composed of moderately dense, fulvous, mainly simple setae except as follows: coxae with setae as on mesepisternum, basitarsi with dense, brownish, sturdy clothing on inner surfaces (mesobasitarsus with two to three major wavy setae), microtrichia on outer mesotibial surface (velvety area) composed of dense, fulvous, simple, minute setae (Fig. 9); anterior margin of velvety area slightly concave and not as dense as remainder of velvety area, anterior mesotibial tuft oblong, paramecium-like, as wide as two-thirds of contiguous (posterior) velvety area, slightly diagonal to anterior mesotibial margin, composed of dense, pale, setae; posterior tuft composed of two major lobes sitting in a horseshoe shaped cavity, posterior-most lobe round, anterior lobe elongate, tear-shaped, both lobes separated longitudinally by a crease of integument almost as thick as anterior lobe, but connected by sparse setae on proximal section of the horseshoe cavity; both lobes with setae comparable to those on anterior tuft (Figs. 9, 77); metatibial outer surface with pale, simple setae, moderately dense on anterior margin, rather scattered on outer surface, and long on distal half of posterodorsal margin (Fig. 10); metatibial organ slit closed with brown setae (some setae appear lighter in

specimens collected in flight intercept traps) (Fig. 10); inner metatibial depression devoid of setae (as opposite to the moderately dense, fulvous, simple setae on remainder of inner surface) (Fig. 11). Metasomal terga vestiture as follows: moderately dense, pale, minutely branched, long setae on anterior dorsal half and anterolateral corners of first tergum, similar setae but appearing simple, shorter and appressed, on lateral margins of remainder terga, as well as posterior half of fifth tergum and entire surface of sixth to seventh terga; posterior dorsal half of first tergum through anterior half of fifth tergum with dense, dusky, appressed short setae, intermixed with some scattered, darker, longer setae (Figs. 1, 3); metasomal sterna covered with setae as those on lateral areas of terga; integumental depressions on second sternum lined with fulvous, appressed, simple setae (Fig. 15).

Terminalia. Seventh metasomal sternum with posterior disc margin invaginated, bearing a row of rather scattered setae (Fig. 17). Eighth metasomal sternum as described for subgenus (Fig. 18). Gonocoxite as described for subgenus, except dorsal process about as long as broad, but convexly projected (thumb-like), basal incision broadly concave (Fig. 20); lateral section of gonostylus following general description for the subgenus, with broadened base and with a dense row of moderately-long setae along concave dorsal margin (*vide* Comments) (Figs. 22, 88).

♀ (**previously unknown**): *Structure.* Total body length 10.89 mm; labiomaxillary complex in repose slightly but clearly surpassing metasomal tip (Figs. 5-6). Head length 2.88 mm; head width 4.52 mm; upper interorbital distance 2.33 mm; lower interorbital distance 2.26 mm; upper clypeal width 1.11 mm; lower clypeal width 1.94 mm; clypeal protuberance 1.04 mm; clypeal and labral ridges as in male, labral windows occupying about four fifths of labral length, equidistant from upper and lower margins; labrum rectangular, slightly wider than long, length 1.15 mm, width 1.26 mm; anterior edge of labrum arched outwards; interocellar distance 0.29 mm; ocellocular distance 0.70 mm; length of first flagellomere (0.44 mm) equal to combined lengths of second and third flagellomeres (0.44 mm); length of malar area 0.15 mm. Mandible tridentate. Pronotal lateral angle as in male; intertegular distance 3.41 mm; mesoscutal length 2.67 mm; mesoscutellar length 1.41 mm; posterior border of mesoscutellum as in male (Fig. 5); mesotibial length 2.33 mm; mesobasitarsal length 2.15 mm, maximum width 0.59 mm; metatibia triangular (scalene triangular) (Fig. 14), metatibial anterior margin length 3.26 mm; metatibial ventral margin length 1.67 mm; metatibial posterodorsal margin length 3.41 mm; metabasitarsus as described for subgenus (Fig. 14), length 1.63 mm, maximum width 0.81 mm. Forewing length 8.52 mm; hind wing with 20 hamuli. Maximum metasomal width 4.52 mm.

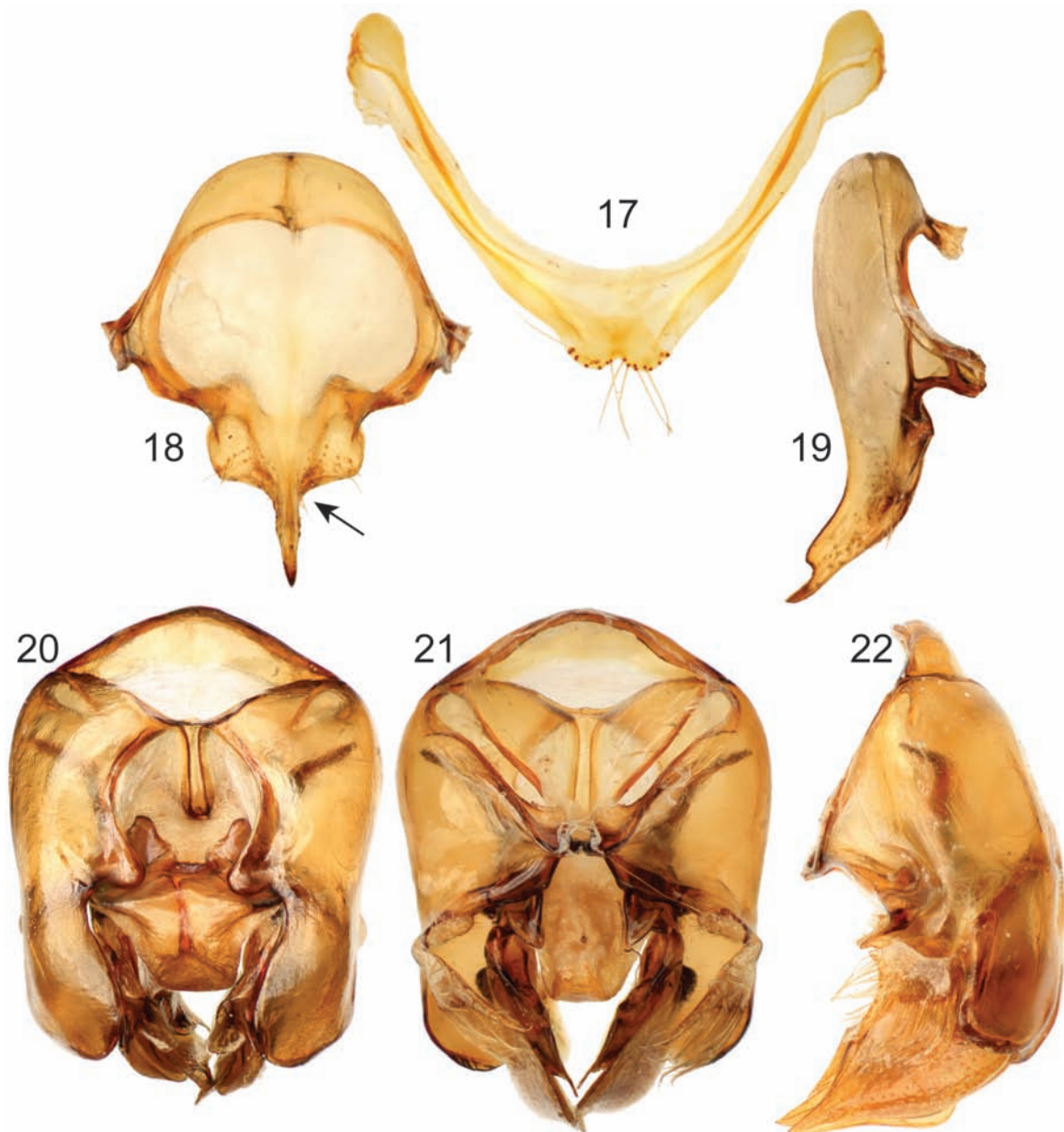


Figs. 7–16. *Euglossa (Alloglossura) samperi* Ram?rez, dark blue morph: 7. Facial aspect of male. 8. Facial aspect of female. 9. Outer surface of male mesotibia. 10. Outer view of male metatibia and metatarsus. 11. Inner view of male metafemur (arrow pointing to proximal convexity) and metatibia (arrow pointing to inner depression). 12. Inner view of male mesobasitarsus (arrow pointing to carinate elevation). 13. Male mesodistitarsus (arrow pointing to claw-like projection). 14. Outer view of female hind leg. 15. Male premaular area (arrow pointing to premaular spot). 16. Section of male second metasomal sternum (arrow pointing to integumental modifications).

Coloration. In general as described for dark blue morph of male except blue-purple coloration stronger and dominant all over (Figs. 5-6). Paraocular marks and

premaular spot absent (Fig. 8).

Sculpturing. As described for male except no differentiation on premaular area (premaular spot absent);



Figs. 17–22. Male genitalic features of *Euglossa (Alloglossura) samperi* Ramírez: 17. Seventh metasomal sternum, ventral aspect. 18. Eighth metasomal sternum, ventral aspect (arrow pointing to invagination on posterior process). 19. Eighth metasomal sternum, lateral aspect. 20. Genitalic capsule, dorsal aspect. 21. Genitalic capsule, ventral aspect. 22. Genitalic capsule, lateral aspect.

metasomal sterna with smooth mesial areas.

Vestiture. As described for male (setal features on pro-tarsi, meso- and metatibia are exclusive of male) except as follows: Mesoscutellar tuft rhomboid, elongate, occupying about four-fifths of mid-mesoscutellar length, composed of dense, dark, erect, multibranched (branches minute) setae (Fig. 5). Foreleg with slightly shorter setae on posterior surface as compared to male (Fig. 6); metatibial corbicula surrounded by setae as on male metatibia (Fig. 14). Sixth metasomal tergum with longer setae than

on terminal (seventh) metasomal tergum of male (Figs. 5–6), mesial sections of all sterna, along area occupied by labiomaxillary complex, bare.

Material examined.—Ecuador: “SR1906 Apr.8.2005 Bilsa, Naranja trail; 1100 Esmeraldas Ecuador 00°21’N; 79°44’W 500m Cineole leg S.; Ramirez // *Euglossa samperi*; Ramirez (2006); Holotype [type label, handwritten, red paper]” (1♂) QCAZ (photographs); labeled as previous, except collecting code label “SR2012” and last line of second label “Paratype [type label, handwritten, yellow

paper]" (1♂) SEMC; "ECUADOR: Pichincha; Maquipucuna Biological Station,; River Trail, 1200 m; 0°7'34"N, 78°37'57"W; 27-29 OCT 1999; Z.H. Falin; ECU1F99 053; ex: flight intercept trap // [bar code]; SM0188035; KUNHM-ENT // *Euglossa (Glossurella)*; *trinotata* Dressler, 1982; Det. M.L. Oliveira, 2000" (1♂) SEMC; labeled as previous except barcode number "SM0188036" (1♂) SEMC; "ECUADOR: Pichincha; Maquipucuna Biological Station,; Principal Trail, 1275 m; 0°7'22"N, 78°39'0"W; 27-29 OCT 1999; Z.H. Falin; ECU1F99 048 ex: flight intercept trap // [bar code]; SM0187997; KUNHM-ENT // *Euglossa (Glossurella)*; *trinotata* Dressler, 1982; Det. M.L. Oliveira, 2000" (1♂) SEMC; "Ecuador: El Oro; Piñas, 960 m.; 26 II-2 III 1982; N. H. Williams // 6 [pencil, handwritten] // cineole" (1♂) SEMC; "ECUADOR: Pichincha; 45 km NNW Quito; Macquipucuna Station; 1600-1650 m; 3-18 APR 1996; ECU1H96012; P.Hibbs; ex: flight intercept trap // [bar code]; SM0087223; KUNHM-ENT // *Euglossa (Glossurella)*; *trinotata* Dressler, 1982; Det. M.L. Oliveira, 2000" (1♂) SEMC; labeled as previous except barcode numbers "SM0087230" (1♂) "SM0087231" (1♀) both in SEMC.

Comments.—Despite the unavailability of the holotype, the one paratype that was examined matched the original description (Ramírez, 2006), which was based on a type series of 14 males from a single locality in northwestern Ecuador, all of which comply with the green, golden-bronzy coloration morph (Figs. 1–2). The other specimens examined in this study (six males plus the newly described female) corresponding to the dark blue morph (Figs. 3–4), were originally believed to be a different species. However, when compared side by side with a male paratype they were morphologically identical, especially in features of the midleg (inner mesobasitarsus, distitarsal angle) and metatibia (Figs. 11–13), which together are not found in any other species in the group. The coloration differences, including the presence of an ivory spot on the antennal scape (reduced) in the golden-bronze morph are not considered sufficient to assign them to different species. As discussed below for other species in the group (notably *E. [A.] oleolucens* and *E. [A.] gorgonensis*), integumental coloration varies strongly in *Alloglossura* and is not uncommon in other groups within *Euglossa s. l.* (e.g., Dressler, 1978a; Roubik, 2004; Hinojosa-Díaz and Engel, 2011a). Six of the blue specimens are from the Maquipucuna Station on the Pacific Andean slope in northwestern Ecuador at a relatively high elevation (1,200 m or slightly higher) when compared to the type locality in the same area but at 500 m (Fig. 95), an extra male from southwestern Ecuador also on the Pacific Andean slope (Piñas, El Oro) is from a slightly lower elevation than the Maquipucuna specimens (960 m), and, although closer in terms of coloration to those, is slightly greener than blue. This same specimen exhibits a slight facial deformity, af-

fecting the symmetry of the lower facial section. It is possible that the color morphs as here described are related to the elevational ranges where they were collected – golden-bronzy specimens in the lower areas of the Pacific region in Ecuador, and blue specimens at mid-elevations on the Andean slope. Only additional collecting in the area will clarify this. With respect to other species in the subgenus, males of *E. (A.) samperi* are morphologically closer to males of *E. (A.) trinotata* and share a similar habitus, facial ivory coloration, and structure of the mesotibial tufts (Figs. 77–78). The most notable differences between both species are the morphology of the mesotarsus, the length of the labiomaxillary complex, and the size of the promaular spot. Ramírez (2006) reported a close resemblance of *E. (A.) samperi* to *E. (A.) paisa*, which has also a relatively similar habitus and comparable (although distinctive) mesotibial tufts; nonetheless, as specimens of this last species were not available for examination for this study, the structure of the mesobasitarsus and mesodistitarsus remain unclear since there is no mention of these features in the original description (Ramírez, 2005). The higher elevation blue morph of *E. (A.) samperi* is more similar in general coloration to *E. (A.) paisa*, which occupies higher elevations (around 1,700 m) in the Colombian Cordillera Central (Fig. 95). From the known material, it seems that *E. (A.) samperi* and *E. (A.) trinotata* have none or little overlap in their distributional ranges, both species occupying potentially a similar elevational range but the first restricted to the Ecuadorian Pacific side of the Andes and contiguous lowlands, while the other is from the northern extreme of Ecuador into Colombia (Fig. 95).

Euglossa (Alloglossura) trinotata Dressler
Figs. 23–31, 78, 83, 89, 95

Euglossa (Glossurella) trinotata Dressler, 1982: 131–140 [139]. Holotype ♂ (USNM, *visum*).

Diagnosis (based on male characters).—Labiomaxillary complex in repose surpassing tip of metasoma by about length of mesoscutum plus mesoscutellum (Figs. 23–24); integument coloration predominantly green on all body areas, with some blue-purple iridescence noticeable on mesoscutum and mesoscutellum, otherwise golden-bronzy iridescence all over, especially on metasomal terga where it can turn slightly reddish (Figs. 23–24); paraocular ivory marks well developed, triangular, lower width occupying no more than one-third of horizontal section of epistomal sulcus, antennal scape with ivory-yellowish spot on lateral surface; clypeal disc with brown coloration well developed on upper half along medial ridge (Figs. 24–25); preomalar area brown-amber all over with strong



Figs. 23–24. *Euglossa (Alloglossura) trinotata* Dressler, male: 23. Dorsal habitus. 24. Lateral habitus.

blue-purple iridescence (Fig. 29); lower interorbital distance slightly narrower than upper interorbital distance (Fig. 25); labrum rather square, slightly wider than long; anterior mesotibial tuft oblong, slender; posterior tuft bilobbed sitting in a horseshoe shaped cavity, posterior-most lobe round, anterior lobe elongate, lobes separated longitudinally by an integumental crease (Figs. 26–78); mesotibial spur present; mesobasitarsus unmodified on inner surface (Fig. 27); mesodistitarsus simple, with no projection on antero-distal angle (Fig. 28); male metatibia with circular depression devoid of setae on inner surface; second metasomal sternum with two shallow semicircular depressions, lined with setae (Fig. 30); dorsal process of gonocoxite narrow, triangular, basal incision broadly concave (Fig. 83); gonostylar lateral section broadened at the base, with a dense row of moderately long setae along strongly concave dorsal margin (Fig. 89).

Description.—♂: *Structure.* Total body length 12.66 mm (12.44–12.81; n=5); labiomaxillary complex in repose surpassing tip of metasoma by about the combined length

of mesoscutum plus mesoscutellum (Figs. 23–24). Head length 2.89 mm (2.74–3.26; n=5), width 4.64 mm (4.56–4.74; n=5); upper interorbital distance 2.20 mm (2.16–2.26; n=5); lower interorbital distance 2.17 mm (2.15–2.19; n=5); upper clypeal width 1.32 mm (1.19–1.41; n=5); lower clypeal width 2.04 mm (2.00–2.07; n=5); clypeal protuberance 1.07 mm (1.04–1.11; n=5); clypeal ridges, labral ridges and windows as described for *E. (A.) samperi*; labrum rather square in frontal view, slightly wider than long, length 1.29 mm (1.26–1.33; n=5), width 1.31 mm (1.26–1.41; n=5); interocellar distance 0.29 mm (0.26–0.30; n=5); ocellocular distance 0.65 mm (0.63–0.67; n=5); first flagellomere almost as long [0.44 mm (n=5)] as second and third flagellomeres combined [0.44 mm (n=5)]; length of malar area 0.10 mm (0.07–0.13; n=5). Mandible bidentate. Pronotal dorso-lateral angle as described for subgenus; intertegular distance 3.45 mm (3.37–3.56; n=5); mesoscutal length 2.94 mm (2.89–2.96; n=5); mesoscutellar length 1.50 mm (1.48–1.52; n=5); mesal area of mesoscutum slightly concave; posterior margin of mesoscutellum strongly convex (Fig. 23); mesotibial length 2.41 mm (2.37–2.48; n=5); mesotibial spur present; mesobasitarsal length 2.23 mm (2.15–2.37; n=5), width 0.79 mm (0.74–0.81; n=5) (as measured at proximal posterior keel), posterior keel as described for *E. (A.) samperi*, inner mesobasitarsal surface even, unmodified (at most with an even mesal elevation) (Fig. 27); antero-distal angle of mesodistitarsus simple, (Fig. 28); metafemur as described for *E. (A.) samperi* (Fig. 31); metatibial shape as described for *E. (A.) samperi* (Fig. 31), metatibial anterior margin length 3.37 mm (3.30–3.48; n=5), ventral margin length 2.20 mm (2.15–2.22; n=5), postero-dorsal margin length 4.19 mm (4.07–4.30; n=5), maximum metatibial thickness 0.95 mm (0.89–1.00; n=5); metatibial organ slit narrow, basal section oval, length 0.35 mm (0.30–0.41; n=5), distal section spur shaped, maximum width occupying about one-fourth of metatibial outer surface width (Fig. 31); metatibial inner surface with a depression as described for *E. (A.) samperi* but slightly smaller; metabasitarsal length 2.52 mm (2.44–2.59; n=5), mid-width 0.86 mm (0.74–0.96; n=5); metabasitarsal ventral margin slightly oblique, convexly projected (Fig. 31). Forewing length 9.33 mm (9.04–9.70; n=5); jugal comb with 15–18 blades (n=5); hind wing with 19–22 hamuli (n=5). Maximum metasomal width 4.67 mm (4.59–4.81; n=5); second metasomal sternum with two shallow semicircular depressions as described for *E. (A.) samperi* (Fig. 30).

Coloration. Head mainly green with some blue-green on antennal depressions, vertex, and gena, golden-bronzy hue all over; most other facial coloration features as described for *E. (A.) samperi*, except brown colored surfaces slightly lighter, brown spot on upper half of medial ridge of clypeus broader, antennal scape with ivory (rather yell-



Figs. 25–31. *Euglossa (Alloglossura) trinotata* Dressler: 25. Facial aspect of male. 26. Outer surface of male mesotibia. 27. Inner view of male mesobasitarsus (arrow pointing to uniform surface). 28. Male mesodistitarsus (arrow pointing to unmodified angle). 29. Male preomalar area (arrow pointing to preomalar spot). 30. Section of male second metasomal sternum (arrow pointing to integumental modifications). 31. Outer view of male hind leg (arrow indicating proximal metafemoral convexity).

lowish) spot along lateral surface (Fig. 25). Pronotum green with blue-green and brown iridescence on lower ventral areas and anterior facing surface of pronotal lobe otherwise bronzy hue all over; mesoscutum, mesoscutellum and tegula green with a mixture of blue-purple and golden-bronzy iridescence, tegula with brown-amber coloration on antero-lateral margins (Figs. 23–24); mesepisternum on lateral-facing surface colored as mesoscutum,

although with a lighter green (Fig. 24); preomalar area completely brown-amber with strong blue-purple iridescence (Fig. 29); metepisternum and propodeum concolor with mesepisternum, although with a succession of bluish and brown on lower parts; legs with same pattern as in *E. (A.) samperi*, except mainly green and with weaker blue-purple iridescence, and brown amber colored areas lighter than in the aforementioned species (Figs. 24, 26,

31); wings as described for *E. (A.) samperi*. Metasomal terga olive green with strong golden-bronzy iridescence all over (turning reddish in some specimens), and some blue-green highlights especially on ventral smooth areas of first metasomal tergum (Figs. 23-24); sterna concolorous with terga (Fig. 24, 30).

Sculpturing. General sculpturing as described for *E. (A.) samperi* except preocular area, where punctures are considerably smaller and less dense giving the appearance of smooth integument, punctures become denser on preocular spot (upper lateral section of preocular area) which is about as twice as large as on *E. (A.) samperi* (Fig. 29).

Vestiture. General vestiture as described for *E. (A.) samperi*, except as follows: anterior mesotibial tuft oblong, slender, about one third as wide as contiguous (on posterior side) velvety area, setae on postero-dorsal corner colored dark brown in contrast to remainder pale setae, posterior tuft structurally similar to the one in *E. (A.) samperi* (bilobed sitting in a horseshoe-shaped cavity) but anterior lobe extending further down (Figs. 26-78).

Terminalia. Seventh metasomal sternum as described for *E. (A.) samperi*. Eighth metasomal sternum as described for subgenus. Gonocoxite as described for subgenus, except dorsal process triangular, acute, rather reduced, basal incision broadly concave (Fig. 83); lateral section of gonostylus following general description for subgenus, with a broadened base and a strongly concave dorsal margin, lined with a row of dense, moderately long setae (Fig. 89).

♀: Unknown.

Material examined.—Colombia: “Colombia: El Valle; Buenaventura: Campa; miento [Campamento] de Pupapel; 1 II 1972 [day, month and last digit of year handwritten] // Helen Kennedy; colr. // 1,8-Cineole // HOLOTYPE; *Euglossa; trinotata* Dressler; R.L.Dressler, 1982 [type label, fade red color] // USNM; 00534458; [barcode] [yellow label]” (1♂) USNM; “COLOMBIA: Ant. [Antioquia]; Urrao: La Clara; 1270 m:8 XI 1982; J.P.Folsom B65C” (1♂) SEMC; Ecuador: “90 // Ecuador: Esmeraldas; km 17 Lita-Alto Tambo; 730 m; 18 Jan. 1990; M. Whitten // cineole [on underside]” (1♂); labeled as previous except number on first label “140”, “142”, “143”, “150” (4♂♂) FLMNH; labeled as previous, except number on first label “121” and chemical compound on last label “P-methoxy; phenylethyl alc. [handwritten on underside]” (1♂) FLMNH.

Comments.—Males of *E. (A.) trinotata* have the longest labiomaxillary complex of all species in *Alloglossura* (Figs. 23-24), and besides the species of the *Glossura* + *Glossuropoda* clade, no other *Euglossa s. l.* has a longer labiomaxillary complex (the subgeneric name was mainly based on this fact). Among the specimens reviewed some exhibit certain (although not strong) variation in integ-

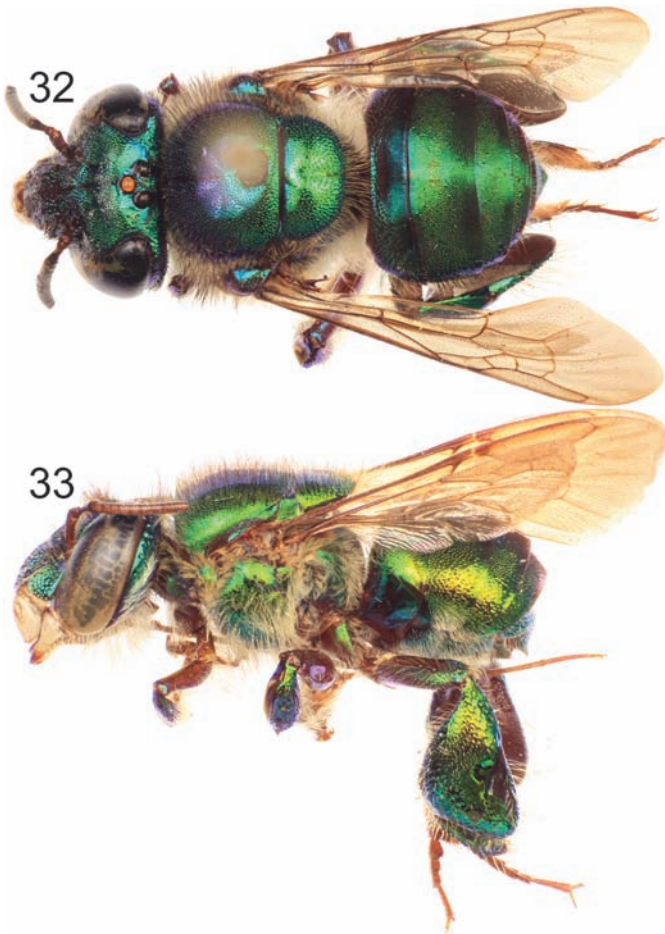
umental coloration. Some specimens have a little more blue-green all over the body, some others having stronger golden-bronzy iridescence on the metasomal terga, turning slightly reddish in a few specimens; however, since the species is known from so little material and most of those examined in this study are from a single locality, no variation could be associated with geographical distribution. It is interesting to note that *E. (A.) trinotata* has a similar pattern of body coloration (including ivory colored facial areas) with one examined male of *E. (Glossura) ignita* Smith from the same collecting event as the Esmeraldas specimens of *E. (A.) trinotata*; the labiomaxillary complex of both species is also comparable in length. *Euglossa ignita* has some color variation along its distributional range, thought to be part of a mimicry complex with other species of *Glossura* (vide Roubik, 2004). *Euglossa (A.) trinotata* has a distribution along low to mid-elevations on the Andean Pacific slope of northern Ecuador and Colombia, and as mentioned for *E. (A.) samperi*, it is possible that both species are allopatric along the Pacific slope of the Colombian and Ecuadorian Andes (Fig. 95). Given the few known records for both species, a better understanding of the distributional exclusion as here proposed between these two species will require intensive sampling in the region.

Euglossa (Alloglossura) gorgonensis Cheesman
Figs. 32–44, 79, 84, 90, 95

Euglossa gorgonensis Cheesman, 1929: 141–154 [146]. Holotype ♀ (NHML, *visum*).

Euglossa (Glossura) gorgonensis erythrophana Dressler, 1978: 167–185 [170]. Holotype ♂ (USNM, photographs of type provided). **New synonymy.**

Diagnosis.—Labiomaxillary complex in repose surpassing tip of metasoma, in male by nearly one metasomal tergum length (Figs. 33-35), in female just slightly over metasomal tip (Figs. 36-37); integument coloration in both sexes green, male specimens exhibiting a range of intermixed iridescent coloration, in some blue-green (combined with purple lights) dominant (Figs. 32-33), in others golden-bronzy stronger, this last turns into reddish in some specimens (Figs. 34-35); known female specimens green with golden-bronzy iridescence and some blue-green (Figs. 36-37); male with paraocular ivory marks vestigial, very narrow or absent, antennal scape with no ivory spot (Figs. 33, 35, 38); clypeal disc in male with brown coloration covering most of the surface between paramedial ridges (Fig. 38), in female reduced to area along upper half of medial ridge (Fig. 39); male preocular area green with small purple spot on upper lateral sec-



Figs. 32–33. *Euglossa (Alloglossura) gorgonensis* Cheesman, male (predominantly blue-green morph): 32. Dorsal habitus. 33. Lateral habitus.



Figs. 34–35. *Euglossa (Alloglossura) gorgonensis* Cheesman, male (predominantly bronzy-red morph): 34. Dorsal habitus. 35. Lateral habitus.

tion (Fig. 43); lower interorbital distance noticeably narrower than upper interorbital distance in both sexes (Figs. 38–39); labrum rather square in both sexes; male with anterior mesotibial tuft oblong; posterior tuft simple, tear shaped (Figs. 40, 79); mesobasitarsus unmodified on inner surface; mesodistitarsus simple, with no projection on antero-distal angle; inner surface of male metatibia even, with no evident depression; second metasomal sternum in the male with no integumental modifications (Fig. 44); dorsal process of gonocoxite broad and short, proximal section of inner margin of gonocoxite straight (no basal incision) (Fig. 84); gonostylar lateral section broadened at base, dorsal margin shallowly concave bearing no setae (Fig. 90).

Description.—♂: *Structure.* Total body length 10.28 mm (9.63–11.11; n=5); labiomaxillary complex in repose surpassing tip of metasoma by almost one metasomal tergum length (Figs. 33–35). Head length 2.69 mm (2.44–2.81; n=5), width 4.07 mm (3.96–4.19; n=5); upper interorbital distance 1.99 mm (1.93–2.06; n=5); lower interorbital distance 1.79 mm (1.77–1.81; n=5); upper clypeal width

1.04 mm (1.00–1.07; n=5); lower clypeal width 1.70 mm (1.67–1.74; n=5); clypeal protuberance 0.74 mm (0.67–0.81; n=5); clypeal ridges as described for *E. (A.) samperi*; labrum square on frontal view, length 1.01 mm (0.95–1.04; n=5), width 1.04 mm (0.98–1.11; n=5), medial labral ridge sharp; paramedial labral ridges rather blunt, oblique, running on about four fifths of labral length; labral windows ovoid, occupying slightly more than half the labral length on proximal margin; interocellar distance 0.29 mm (0.28–0.30; n=5); ocellocular distance 0.58 mm (0.54–0.62; n=5); first flagellomere almost as long [0.38 mm (0.37–0.41; n=5)] as second and third flagellomeres combined [0.37 mm (0.36–0.37; n=5)]; length of malar area 0.07 mm (0.06–0.10; n=5). Mandible bidentate. Pronotal dorso-lateral angle as described for subgenus; intertegular distance 3.07 mm (3.04–3.19; n=5); mesoscutal length 2.45 mm (2.41–2.52; n=5); mesoscutellar length 1.23 mm (1.19–1.26; n=5); mesal area of mesoscutum slightly concave; posterior margin of mesoscutellum strongly convex (Figs. 32, 34); mesotibial length 2.01 mm (1.93–2.07; n=5); meso-

tibial spur present; mesobasitarsal length 1.84 mm (1.78–1.93; n=5), width 0.65 mm (0.59–0.67; n=5) (as measured at proximal posterior keel), posterior keel projected in a slightly obtuse angle, inner mesobasitarsal surface even, unmodified, as described for *E. (A.) trinotata*; antero-distal angle of mesodistitarsus simple; proximal convexity on inner-ventral margin of metafemur, noticeable but not as pronounced as in *E. (A.) samperi* (Fig. 41); metatibial shape nearly as described for the two previous species, however in most specimens, slightly obtuse on intersection of anterior and ventral margins (Fig. 41), metatibial anterior margin length 3.11 mm (2.96–3.26; n=5), ventral margin length 1.99 mm (1.85–2.15; n=5), postero-dorsal margin length 3.75 mm (3.48–4.00; n=5), maximum metatibial thickness 0.92 mm (0.81–0.96; n=5); metatibial organ slit narrow, basal section oval, length 0.37 mm (0.33–0.44; n=5), distal section spur shaped, maximum width occupying about one-fourth of metatibial outer surface width (Fig. 41); metatibial inner surface with no depression near basitarsal joint; metabasitarsal length 1.90 mm (1.85–2.00; n=5), mid-width 0.72 mm (0.70–0.74; n=5); metabasitarsal ventral margin slightly oblique, convexly projected (Fig. 41). Forewing length 7.84 mm (7.11–8.30; n=5); jugal comb with 12–13 blades (n=5); hind wing with 15–19 hamuli (n=5). Maximum metasomal width 4.08 mm (3.93–4.22; n=5); second metasomal sternum with no integumental modifications (Fig. 44).

Coloration. Head green, most specimens with strong golden-bronzy iridescence all over (Figs. 34–35); some (*vide Comments*) with green coloration fading into blue-green on frons, vertex and lower paraocular areas (Figs. 36–38); sulci and ridges brown, integument of clypeal disc with a mixture of basal green and a noticeable brown coloration covering most of the surface between paramedial ridges (by comparison to most other species in the subgenus, in which brown coloration is restricted to contiguous areas along medial ridge) (Fig. 38); paraocular ivory marks extremely narrow, in some specimens only evident as thin spots near antennal socket, or entirely absent (ivory coloration fading with metallic integument); remainder of facial coloration features as described for *E. (A.) samperi* (Fig. 38). Pronotum green, most specimens with with golden-bronzy iridescence all over, some (*vide Comments*) with this turning reddish (Figs. 34–35), while others with golden-bronzy iridescence not as strong, instead with marked blue-green iridescence, especially on lower ventral areas and anterior facing surface of pronotal lobe (Figs. 32–33); mesosoma green, with same range of iridescent coloration as described for pronotum, which is, most specimens with golden-bronzy iridescence all over, varying from light to very strong, even turning reddish on some specially on mesoscutum (Figs. 34–35), other specimens with more noticeable blue-green iridescence evenly

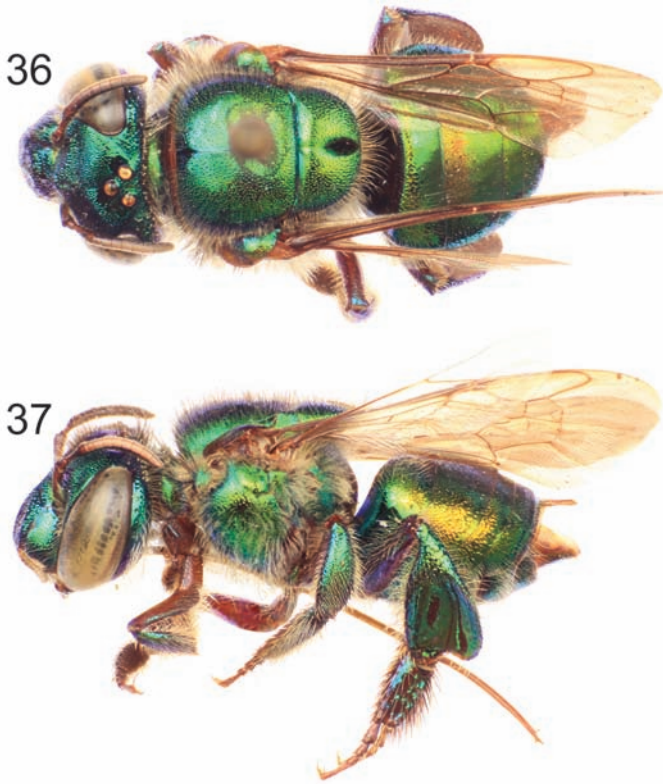
distributed, but also most noticeable on mesoscutum and propodeum (Figs. 32–33) (*vide Comments*), preomaular spot purple, slightly smaller than in the blue morph of *E. (A.) samperi* (Fig. 43); legs following the coloration pattern of the previously described species, but also reflecting the variation seen on other mesosomal areas respect golden-bronzy iridescence, ranging from weak to strong and in some specimens appearing reddish on outer surface of metatibia (*vide comments*); wings as described for *E. (A.) samperi* although slightly lighter. Metasomal terga following the variation described for mesosoma (*vide comments*), most specimens with green base color, golden-bronzy iridescence on all terga, in some specimens turning reddish, especially on anterior two thirds of first two metasomal terga, while other with a reddish uniform appearance over all metasomal terga (Figs. 34–35); few specimens with blue-green iridescence on posterior third of first three metasomal terga (Fig. 32); sterna mainly green, but reflecting same degree of variation in iridescence, from weak golden-bronzy all over, to reddish in some specimens.

Sculpturing. General sculpturing as described for *E. (A.) samperi* (albeit slightly stronger), except larger punctures on posterior half of mesoscutellum, and last three metasomal terga with punctures comparable in size to those on clypeus (as opposed to larger punctures restricted to last two terga) (Figs. 32–35).

Vestiture. General vestiture as described for *E. (A.) samperi*, except as follows: setae on mesoscutum and mesoscutellum slightly shorter; anterior mesotibial tuft with dark setae along posterior margin contrasting with pale setae on anterior section, posterior metatibial tuft unique (not bilobed, although see comments), tear shaped, about two-thirds as long as anterior tuft (Figs. 40, 79); metatibial inner surface with moderately dense, fulvous, short setae all over (no bare area near basitarsal joint); second metasomal sternum with no identifiable differentiation of setae arrangement on areas where other species have integumental depressions, rather replaced by a small bare spot (Fig. 44).

Terminalia. Seventh metasomal sternum as described for *E. samperi*. Eighth metasomal sternum as described for subgenus. Gonocoxite as described for subgenus, except dorsal process characteristically broad and not prominently projected, basal incision absent, *i.e.*, proximal section of inner margin of gonocoxite straight (Fig. 84); lateral section of gonostylus following general description for the subgenus, slender, base not as broad as in previous species forming a continuous shallowly concave dorsal margin devoid of setae (Fig. 90).

♀: *Structure.* Total body length 10.89 mm (10.52–11.26; n=2); labiomaxillary complex in repose slightly surpassing metasomal tip (Figs. 36–37). Head length 2.93 mm



Figs. 36–37. *Euglossa (Alloglossura) gorgonensis* Cheesman, female: 36. Dorsal habitus. 37. Lateral habitus.

(2.89–2.96; n=2); head width 4.14 mm (4.11–4.16; n=2); upper interorbital distance 2.10 mm (2.07–2.12; n=2); lower interorbital distance 2.00 mm (n=2); upper clypeal width 1.08 mm (1.04–1.11; n=2); lower clypeal width 1.76 mm (1.74–1.78; n=2); clypeal protuberance 0.71 mm (0.67–0.74; n=2); clypeal and labral ridges as in male, labral windows occupying about two thirds of labral length, closest to upper margin; labrum rather square, length 1.00 mm (0.96–1.04; n=2), width 1.06 mm (1.04–1.07; n=2); interocellar distance 0.30 mm (n=2); ocellocular distance 0.63 mm (n=2); length of first flagellomere [0.37 mm (n=2)] comparable to combined length of second and third flagellomeres [0.32 mm (0.30–0.33; n=2)]; length of malar area 0.11 mm (n=2). Mandible tridentate. Pronotal lateral angle as in male; intertegular distance 3.23 mm (3.19–3.26; n=2); mesoscutal length 2.45 mm (2.37–2.52; n=2); mesoscutellar length 1.24 mm (1.19–1.29; n=2); posterior border of mesoscutellum as in male (Fig. 10); mesotibial length 2.00 mm (1.93–2.07; n=2); mesobasitarsal length 1.78 mm (1.70–1.85; n=2), maximum width 0.56 mm (0.52–0.59; n=2); metatibia triangular (scalene triangular) metatibial anterior margin sinuate, proximally concave, length 2.84 mm (2.78–2.89; n=2); ventral margin length 1.53 mm (1.48–1.58; n=2); metatibial posterodorsal margin length 3.04 mm (2.96–3.11; n=2); metabasitarsus as described for

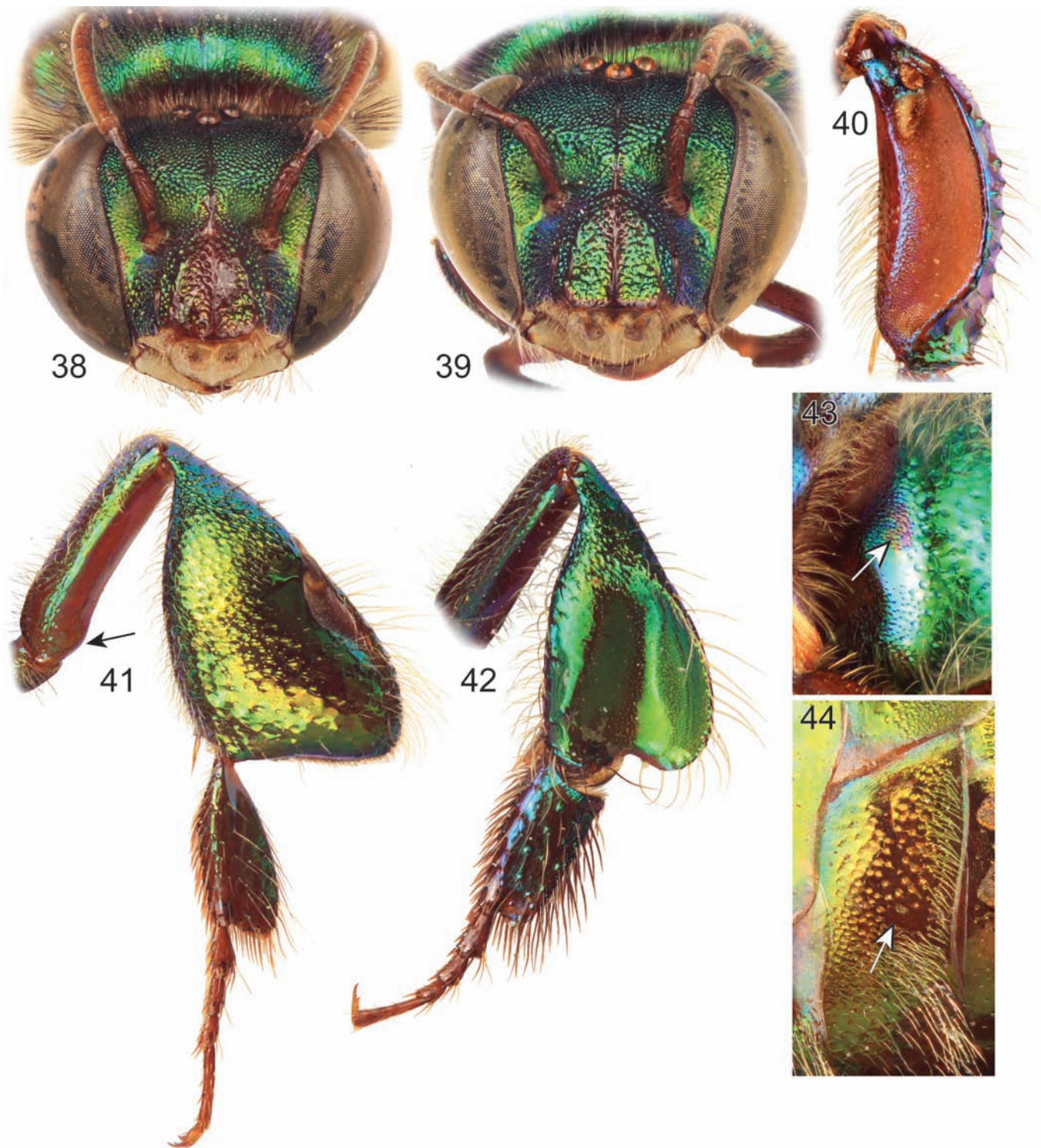
subgenus (Fig. 42), length 1.52 mm (1.48–1.56; n=2), maximum width 0.75 mm (0.74–0.76; n=2). Forewing length 7.71 mm (7.41–8.00; n=2); hind wing with 16–18 hamuli. Maximum metasomal width 4.11 mm (4.07–4.15; n=2).

Coloration. Green all over, with golden-bronzy iridescence all over, never as strong as in some males (*vide* Comments), particularly accentuated on metasomal terga (Figs. 36–37); some blue-green coloration on mesoscutum (especially noticeable in holotype) and margins of major sclerites. Brown coloration on clypeal disc restricted to contiguous areas along upper half of medial ridge. Paracocular marks and preomalar spot absent (Fig. 39).

Sculpturing. As described for male except no differentiation on preomalar area (preomalar spot absent), larger punctures present only last two metasomal terga, and presence of smooth areas on mesial sections of metasomal sterna.

Vestiture. As described for male (setal features on protarsi, meso- and metatibia are exclusive of male) except as follows: Mesoscutellar tuft ovoid, occupying about two-thirds of mid-mesoscutellar length, composed of dense, dark, erect, multibranching (branches minute) setae (Fig. 36). Other features as described for female of *E. (A.) samperi*.

Material examined.—**Colombia:** “Type [type label, round with red margin] // B.M. TYPE; HYM.; 17B.947. [numbers handwritten] // *Euglossa; gorgonensis; Cheesman; Det. L.E. Cheesman.* [taxon name and author handwritten] // Gorgona I.; 2.59.N 78.20W.; July 1924.; L.E. Cheesman.” (1♀) NHML; “COLOMBIA: Valle.; Rio Anchicaya, 400m.; IX-28-76. Bell.; Breed & Michener // *Euglossa; gorgonensis* Cheesman; det R.L.Dressler, 1977 [last two digits of year handwritten]” (1♂) SEMC; same collecting data as previous except determination label “*Euglossa; gorgonensis; Cheesman* ♂; Det I. Hinojosa-Díaz 2011 [species epithet, author and gender handwritten]” (3♂♂) SEMC; “COLOMBIA: Prov.Valle; Rio Anchicaya, 400m.; 10 Feb. 1977. M.D.; Breed & C.D.Michener // *Euglossa; gorgonensis* Cheesman; det R.L.Dressler, 1977 [last two digits of year handwritten]” (1♂) SEMC; **Costa Rica:** “COSTA RICA: Heredia; Puerto Viejo; 5 VIII 1985; R.L. Dressler 363 [mixed handwriting] // *Euglossa; gorgonensis; Cheesman* ♂; Det I. Hinojosa-Díaz 2012” (2♂♂) SEMC; “COSTA RICA: Heredia; (La Selva Biol.Res.); nr. Puerto Viejo, 3-; 10Mar1984, at cineole; Sydney A. Cameron // *Euglossa; gorgonensis* Cheesman; det R.L.Dressler, 1984 [last digit of year handwritten]” (1♂) SEMC; same data except year in determination label “1987” (7♂♂) SEMC; “COSTA RICA: Heredia; Prov., La Selva; 25 July 1976; Robert Gorton coll. // *Euglossa; gorgonensis* Cheesman; det R.L.Dressler, 1987” (1♂) SEMC; “COSTA RICA: Turr-; ialba, Cartago Prov.; 21 II 1965; R. L. Dressler 207 [mixed handwriting] // *Euglossa; gorgonensis; Cheesman* ♂; Det I. Hinojosa-



Figs. 38–44. *Euglossa (Alloglossura) gorgonensis* Cheesman: 38. Facial aspect of male. 39. Facial aspect of female. 40. Outer surface of male mesotibia. 41. Outer view of male hind leg (arrow pointing to proximal metafemoral convexity). 42. Outer view of female hind leg. 43. Male premaular area (arrow pointing to premaular spot). 44. Section of male second metasomal sternum (arrow showing absence of integumental modifications).

Díaz 2012" (1♂) SEMC; "COSTA RICA: Pun.; tarenas: Gofito; 19 VIII 1968; R.L.Dressler 1078 [mixed handwriting] // Beta; ionone [underside] // *Euglossa gorgonensis*; *erythrophana* Dressler; R.L.Dressler, 1974; Paratype [type label, pink margins, last row on underside]" (2♂♂) SEMC; same data as previous except attractant "methyl; cinnamate" (1♂) SEMC; "Costa Rica: Puntarenas Prov.; Las Cruces Biol. Sta. 1300m; 08°47.14'N, 82°57.58'W; 6-VII-2003 I. Hinojosa; Ex:Spadix of *Anthurium* // *Euglossa*; *gorgonensis*; Cheesman ♂; Det I. Hinojosa-Díaz 2012" (1♂) SEMC; same data as previous except date "19-VII-2003" (1♂) SEMC, "22-VII-2003" (1♂) SEMC; same data as previous except date "13-VII-2003" and substract "Ex: Eucalyptus oil" (2♂♂) SEMC; "COSTA RICA: Puntarenas Prov.; Las Cruces Biol. Sta. 1330m; 08°47.14'N, 82°57.58'W; 29-V-2004. J.S. Ashe, Z. Falin; I. Hinojosa. Ex: eucalyptus oil; bait CR1AFH04 042 // [barcode]; SM0600147; KUNHM-ENT // *Euglossa*; *gorgonensis*; Cheesman ♂; Det I. Hinojosa-Díaz 2005" (1♂) SEMC; same as previous except barcode numbers "SM0600145", "SM0600144", "SM0600143", "SM0600142", "SM0600148", "SM0600149" (6♂♂); same data as previous except date "31-V-2004", substract "Ex: on *Anthurium* flowers", collection event "CR1AFH04 062" and barcode numbers "SM0600183", "SM0600184" (2♂♂) SEMC; Panama: "Cerro Campana; Panama; 13Dec1968 [handwritten] // NH Williams [handwritten] // cineole [handwritten on underside] // *Euglossa*; *gorgonensis*; Cheesman ♂; Det I. Hinojosa-Díaz 2012" (2♂♂) SEMC; "PANAMA: Pan.; Cerro Jefe; 25 VII 1968; R.L.Dressler1048 [mixed handwritten] // methyl; cinnamate // *Euglossa*; *gorgonensis*; Cheesman ♂; Det I. Hinojosa-Díaz 2012" (2♂♂) SEMC; "Panama Canal Zone; Navy Reservation; N. of Gamboa 6-Xi-64; R.L. Dressler [handwritten] // VISITING; Gongora sp. [handwritten] // *Euglossa*; (*Glossura*) KU5; Det C D Michener 64 [taxon name handwritten] // *Euglossa*; *gorgonensis*; Cheesman ♂; Det I. Hinojosa-Díaz 2012"" (2♂♂) SEMC; "PANAMA Colon Prov.; 8 km.NW. Gamboa on; Pipeline Road, on; cineole. 12 Jan.; 1981. C.D.Michener // *Euglossa*; *gorgonensis* Cheesman; det R.L.Dressler, 1987" (1♂) SEMC; "PANAMA Colon Prov.; Pipeline Rd., 10 km.; NW. Gamboa (C.Z.); 4 January 1981; C.D.Michener // *Euglossa*; *gorgonensis* Cheesman; det R.L.Dressler, 1987" (1♂) SEMC; "PANAMA: Navy Res.; N. Gamboa, C.Z.; 9 XI 1964; R.L. Dressler 146 // 146 [underside] // *Euglossa* ; 'K.U.15'; *gorgonensis*?" (1♀) SEMC; "PANAMA:C.Z., Navy; Reservation N.; Gamboa, 29 IX1964; R.L.Dressler,113 // 113 // G // *Euglossa*; *gorgonensis* Cheesman; det R.L.Dressler, 1987" (1♀) SEMC; "PANAMA Panama Prov.; Pipeline Rd. km 8); nr.Gamboa (C.Z.) to; cineole 9 May 1981; Robert W. Brooks // RW Brooks; Collection; KUNMH #; 2005-En-053 // *Euglossa*; *gorgonensis*; Cheesman ♂; Det I. Hinojosa-Díaz 2012"" (4♂♂).

Comments.—Before the discovery of the effect of chemical compounds used by plants to attract male euglossine bees (Dodson et al., 1969) and their use as artificial baits, males were not frequently collected and a good number of new species were described based solely on females. Such is the case of *E. (A.) gorgonensis*. Since female *Euglossa s. l.* tend to have a rather conservative external morphology, it is often challenging to match sexes unequivocally. Males of *E. (A.) gorgonensis* are nonetheless quite similar to females, so an unambiguous association of the vastly more available male material is permitted by the female holotype (and other few female specimens known). The female holotype and the other two female specimens examined in this study have a rather uniformly green integument with not so strong golden-bronzy iridescence, and a more noticeable blue-green iridescence on dorsal parts of the body, this last is most strongly developed in the holotype (Figs. 36–37). Males, as described in the coloration section, exhibit a much wider range of variation. Males from Panama and Colombia are closer in coloration to that of the known females (Figs. 32–33), which is not surprising since no females are known from Costa Rica (the northern extreme of the distribution). The strong reddish iridescence of males from some areas in Costa Rica (Figs. 34–35) led Dressler (1978a) to create *E. (A.) gorgonensis erythrophana* to distinguish them from the greener holotype-like specimens. Despite the strong contrast when comparing specimens on both extremes of the coloration (rather uniformly green versus strong reddish iridescence), there is a seeming intergradation in the intensity of golden-bronzy iridescence among specimens along the range of distribution of the species; although it is true, as stated by Dressler (1978a), that only the redder males occur in the Pacific slope of southern Costa Rica, specimens with variable amounts of intensity of golden-bronzy-reddish iridescence are found from Costa Rica to Colombia. We consider it more convenient to recognize the subspecies as synonyms due to the intergradations in coloration observed for the males of this species; adding to this, since females from the Pacific slope of Costa Rica have never been collected, and females of other species of *Alloglossura* tend to have a slightly darker or more extended blue-green to purple coloration than the males, the whole extent of coloration will be better understood when females from this area are collected. Besides coloration, subtle variation exists in the shape of the male metatibia, for which specimens from Costa Rica and Panama tend to have it slightly broader (not as compressed) than the few males available from Colombia. Among the other species in the subgenus, *E. (A.) gorgonensis* is morphologically closer to *E. (A.) fuscifrons*, both having a similarly shaped and unique posterior mesotibial tuft, and similar facial and general habitus features. In general *E.*

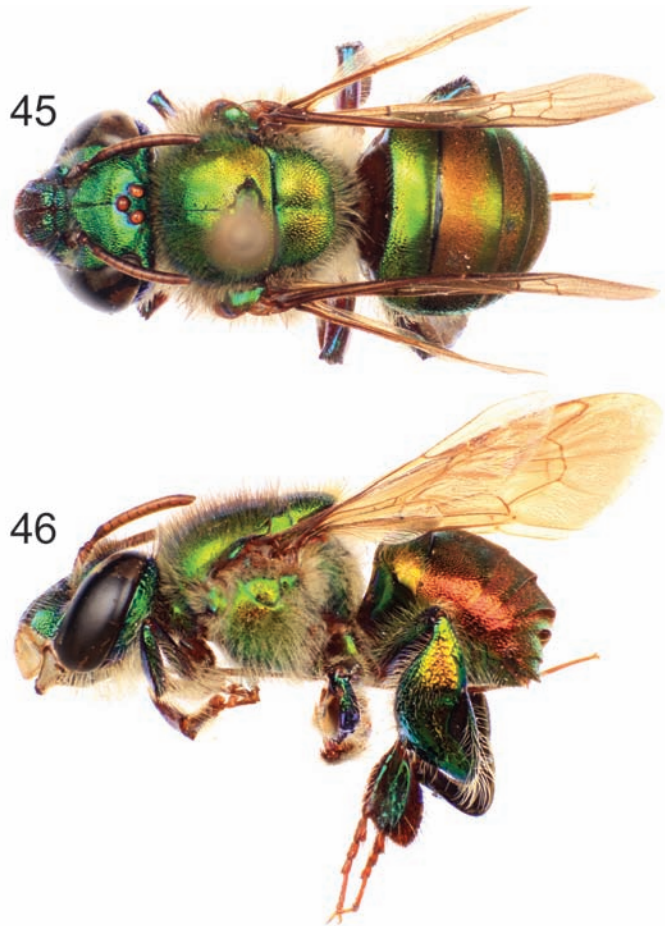
(*A.*) *gorgonensis* occupies lowlands to mid-elevations from Costa Rica to the Pacific lowlands of southern Colombia (Fig. 95).

Euglossa (Alloglossura) oleolucens Dressler
Figs. 45–54, 80, 85, 91

Euglossa (Glossura) oleolucens Dressler, 1978: 167–185 [169]. Holotype ♂ (USNM, photographs of type provided).

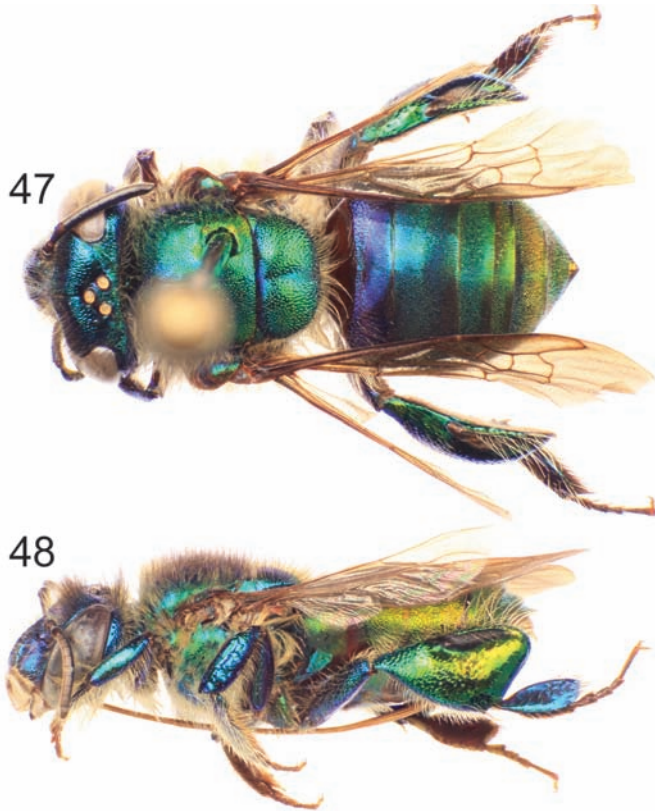
Diagnosis (based on male characters).—Labiomaxillary complex in repose surpassing tip of metasoma by slightly less than length of one metasomal segment (Figs. 45–48); integument coloration predominantly green all over, specimens exhibiting two discrete coloration morphs one in which bronzy-golden (sometimes slightly reddish) iridescence dominates, especially on metasoma (Figs. 45–46), other in which blue-green iridescence is dominant (Figs. 47–48); paraocular ivory marks vestigial (either very narrow or absent), antennal scape with no ivory spot; brown coloration on clypeal disc covering most of the surface between paramedial ridges on upper half, but leaving green areas in lower half (Figs. 49–50); preomalar area concolorous with lateral mesepisternum, besides a small purple spot (preomalar spot) on upper lateral section (Fig. 53); lower interorbital distance noticeably narrower than upper interorbital distance (Figs. 49–50); labrum rather square, slightly wider than long; anterior mesotibial tuft oblong; posterior tuft bilobed sitting in a horseshoe-shaped cavity, anterior lobe elongate, posterior lobe tear shaped, lobes rather contiguous with no integumental crease between them (Figs. 51, 80); mesotibial spur present; mesobasitarsus unmodified on inner surface; mesodistitarsus simple, with no projection on antero-distal angle; male metatibia with circular depression devoid of setae on inner surface; second metasomal sternum in male with two shallow semicircular depressions, lined with setae (Fig. 54); dorsal process of gonocoxite narrow, triangular, basal incision broadly concave (Fig. 85); gonostylar lateral section broadened at base, with straight dorsal margin devoid of setae (or very few at most) (Fig. 91).

Description.—♂: *Structure.* Total body length 11.67 mm (10.74–12.74; n=5); labiomaxillary complex in repose slightly surpassing tip of metasoma (Figs. 45–48). Head length 2.67 mm (2.44–2.96; n=5), width 4.28 mm (4.15–4.41; n=5); upper interorbital distance 2.17 mm (2.07–2.30; n=5); lower interorbital distance 1.89 mm (1.85–1.96; n=5); upper clypeal width 1.09 mm (1.04–1.11; n=5); lower clypeal width 1.78 mm (1.70–1.85; n=5); clypeal protuberance 0.79 mm (0.67–0.89; n=5); clypeal ridges, labral ridges and labral windows as described for *E. (A.) samperi*;



Figs. 45–46. *Euglossa (Alloglossura) oleolucens* Dressler, male (predominantly golden-bronze morph): 45. Dorsal habitus. 46. Lateral habitus.

labrum square on frontal view, slightly wider [1.11 mm (1.04–1.15; n=5)] than long [1.04 mm (1.00–1.07; n=5)]; interocellar distance 0.28 mm (0.26–0.30; n=5); ocellocular distance 0.67 mm (0.64–0.70; n=5); first flagellomere as long [0.37 mm (n=5)] as second and third flagellomeres combined [0.37 mm (n=5)]; length of malar area 0.06 mm (0.04–0.07; n=5). Mandible bidentate. Pronotal dorso-lateral angle as described for subgenus; intertegular distance 3.25 mm (3.19–3.33; n=5); mesoscutal length 2.60 mm (2.46–2.67; n=5); mesoscutellar length 1.26 mm (1.19–1.33; n=5); mesal area of mesoscutum concave; posterior margin of mesoscutellum convex (Fig. 45); mesotibial length 2.19 mm (2.15–2.22; n=5); mesotibial spur present; mesobasitarsal length 1.85 mm (1.78–1.93; n=5), width 0.67 mm (0.61–0.70; n=5) (as measured at proximal posterior keel), posterior keel projected in a slightly obtuse angle, inner mesobasitarsal surface even, unmodified, as described for *E. (A.) trinotata*; antero-distal angle of mesodistitarsus simple; proximal convexity on inner-ventral margin of metafemur weak (yet noticeable) (Fig. 52);



Figs. 47–48. *Euglossa (Alloglossura) oleolucens* Dressler, male (predominantly blue-green morph): 47. Dorsal habitus. 48. Lateral habitus..

metatibial shape as described for *E. (A.) gorgonensis* (Fig. 52), metatibial anterior margin length 3.27 mm (3.26–3.33; n=5), ventral margin length 2.09 mm (2.04–2.15; n=5), postero-dorsal margin length 3.87 mm (3.78–4.00; n=5), maximum metatibial thickness 0.95 mm (0.93–0.96; n=5); metatibial organ slit narrow, basal section oval, length 0.40 mm (0.30–0.44; n=5), distal section spur shaped, maximum width occupying about one-fourth of metatibial outer surface width (Fig. 52); metatibial inner surface with a depression as described for *E. (A.) samperi*; metabasitarsal length 1.97 mm (1.85–2.00; n=5), mid-width 0.83 mm (0.81–0.89; n=5); metabasitarsal ventral margin slightly oblique, convexly projected (Fig. 52). Forewing length 8.53 mm (8.15–8.89; n=5); jugal comb with 12–15 blades (n=5); hind wing with 17–20 hamuli (n=5). Maximum metasomal width 4.46 mm (4.37–4.67; n=5); second metasomal sternum with integumental modifications as described for *E. (A.) samperi* (Fig. 54).

Coloration. Two distinct morphs in terms of general coloration (*vide* Comments), one closely resembling coloration of males of *E. (A.) trinotata* (*vide supra*) (Figs. 45–46, 49), other morph basically colored as blue morph males of *E. (A.) samperi* (*vide supra*) albeit purple not quite so dominant (Figs. 47–48, 50). Remaining features common to

both morphs: brown coloration on clypeal disc covering an area intermediate in size to those in *E. (A.) trinotata* and *E. (A.) gorgonensis*, paraocular ivory marks as described for *E. (A.) gorgonensis* (including same variability), ivory spot on antennal scape absent (Figs. 49–50), size and color of pre-malar spot as described for *E. (A.) gorgonensis* (Fig. 53).

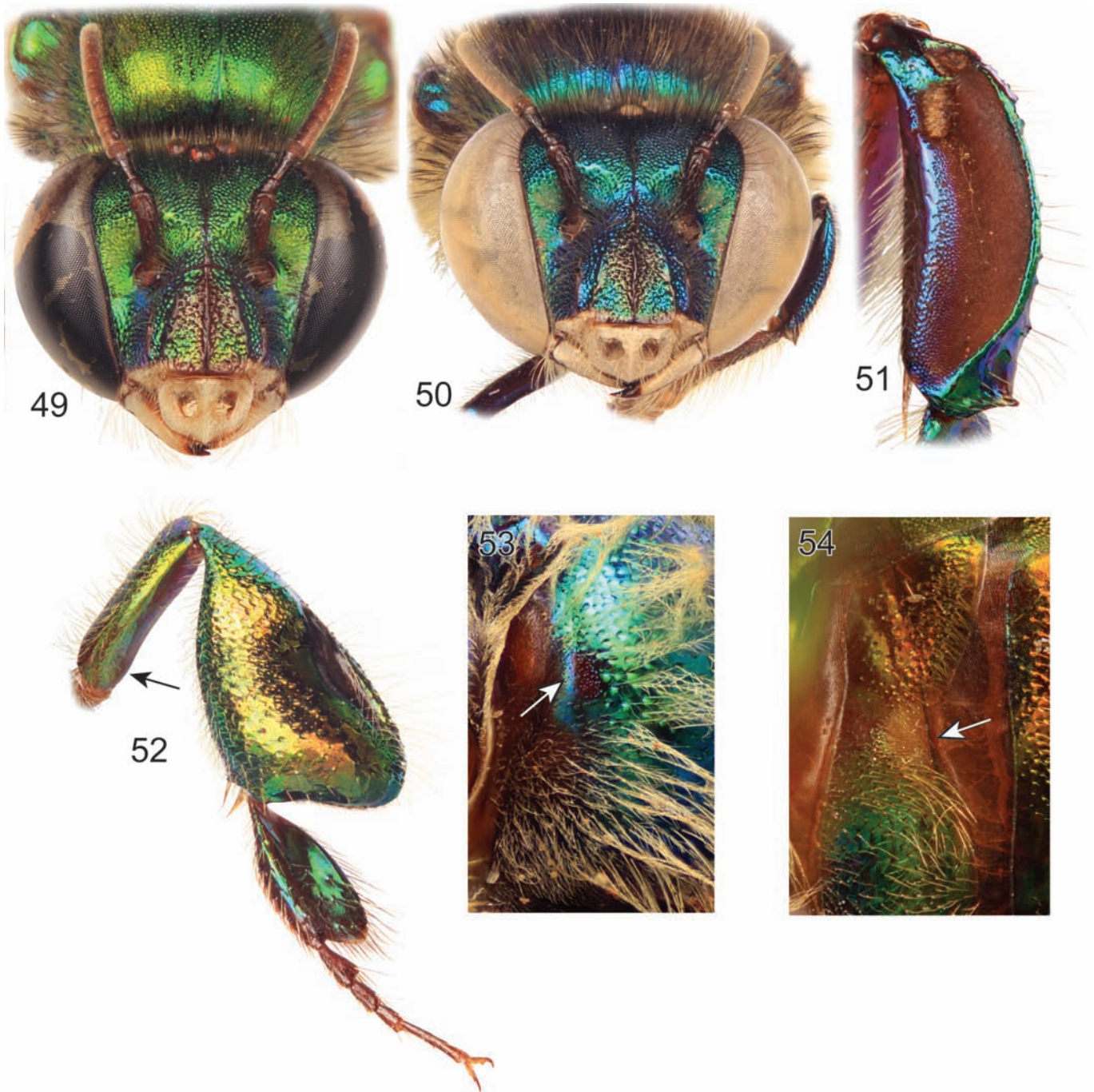
Sculpturing. General sculpturing as described for *E. (A.) samperi*.

Vestiture. General vestiture as described for *E. (A.) samperi*, although setae in general slightly paler, other features as follows: anterior mesotibial tuft shape and setae coloration as in *E. (A.) trinotata*, but size as in *E. (A.) samperi* (Figs. 51, 80), posterior mesotibial tuft essentially as in both *E. (A.) samperi* and *E. (A.) trinotata* (bilobed on a horseshoe-shaped cavity), but anterior lobe slender (very thin), posterior lobe tear shaped and anterior and posterior lobes rather contiguous, not delimited by integumental crease (Figs. 51, 80); second metasomal sternum with setae on metasomal depressions as described for *E. (A.) samperi* (Fig. 54).

Terminalia. Seventh metasomal sternum as described for *E. (A.) samperi*. Eighth metasomal sternum as described for subgenus. Gonocoxite as described for subgenus, dorsal process as described for *E. (A.) trinotata*, basal incision broadly concave (Fig. 85); lateral section of gonostylus following general description for subgenus, slender, similar to that on *E. gorgonensis* but dorsally forming a straight margin with no setae or very few at most (Fig. 91).

♀: Unknown.

Material examined.—Costa Rica: “Pun-; tarenas: Las Cruces,; so. San Vito; 22 VIII 1968; R.L.Dressler 1094 [mixed handwritten] // Cineol [underside] // *Euglossa oleolucens*; Dressler; R.L.Dressler, 1974; Paratype [type label, pink margins, last row on underside]” (2♂♂) SEMC; same as previous except no attractant, no type label and determination label as “*Euglossa; oleolucens*; Dressler; Det I. Hinojosa-Díaz 2004 [species epithet and author handwritten]” (1♂) SEMC; “COSTA RICA: Puntarenas Prov.; Las Cruces Biol. Sta. 1330m; 08°47.14’N, 82°57.58’W; 28-30-V-2004. J.S. Ashe, Z. Falin; I. Hinojosa. Ex: flight intercept; trap. CR1AFH04 059 // [barcode]; SM0697618; KUNHM-ENT // *Euglossa; oleolucens*; Dressler ♂; Det I. Hinojosa-Díaz 2012” (1♂); same data except barcode numbers “SM0697638”, “SM0697637”, “SM0697636”, “SM0697635”, “SM0697634”, “SM0697633”, “SM0697636”, “SM0697631”, “SM0697630”, “SM0697629”, “SM0697636”, “SM0697628”, “SM0697627”, “SM0697626”, “SM0697625”, “SM0697624”, “SM0697623”, “SM0697622”, “SM0697621”, “SM0697620”, “SM0697619”, “SM0697617”, “SM0697616”, “SM0697639” (24♂♂) SEMC; same data as previous except collection date “28-31-V-2004”, collection event “CR1AFH04 060”, year of identification “2005”



Figs. 49–54. *Euglossa (Alloglossura) oleolucens* Dressler: 49. Facial aspect of golden-bronze male. 50. Facial aspect of blue-green male. 51. Outer surface of male mesotibia. 52. Outer view of male hind leg (arrow indicating proximal metafemoral convexity). 53. Male preomalar area (arrow pointing to preomalar spot). 54. Section of male second metasomal sternum (arrow pointing to integumental modifications).

and barcode numbers "SM0697475", "SM0697474", "SM0697476", "SM0697477", "SM0697478", "SM0697479", "SM0697609", "SM0697503", "SM0697642", "SM0697505", "SM0697506", "SM0697480", "SM0697508", "SM0697509", "SM0697510", "SM0697511", "SM0697512", "SM0697640", "SM0697513", "SM0697644", "SM0697643", "SM0697641"

(22♂♂) SEMC; "COSTA RICA Cartago; P.N. Tapanti, 1150 m; 9°45'41" N, 83°47'5" E [W]; 17-20 JUL 2000. J.Ashe, R.Brooks,; Z.Falin CR1ABF00 192; ex. flight intercept trap // [barcode]; SM0211350; KUNHM-ENT // *Euglossa; oleolucens*; Dressler ♂; Det I. Hinojosa-Díaz 2012" (1♂) SEMC; same as previous except barcode "SM0211354"

(1♂) SEMC; "COSTA RICA:Cartago Prov.; Ref.Nac de-Fauna Silvestre; Tapanti, 1.5km E Station; 9°44.97'N, 83°46.90'W; 1240m, 30-X/01-XI-2001; ex. flight intercept trap; R. Brooks, CR 1B01 14 // [barcode]; SM0517178; KUNHM-ENT // *Euglossa; oleolucens*; Dressler ♂; Det I. Hinojosa-Díaz 2012" (1♂) SEMC; "COSTA RICA: Alajuela; E.B. San Ramon, R.B. San Ramon; 27km N & 8km W San Ramon, 810m; 10°13'4"N, 84°35'46"W; 8 JUL 2000, J.Ashe,R.Brooks,Z.Falin; CR 1ABF00 084; ex. flight intercept trap // [barcode]; SM0211582; KUNHM-ENT // *Euglossa; oleolucens*; Dressler ♂; Det I. Hinojosa-Díaz 2012" (1♂) SEMC; same as previous except barcode numbers "SM0211583", "SM0211580", "SM0211584" (3♂♂) SEMC; "COSTA RICA:Guanacaste; Prov., Heliconias Biol. Sta.; 10°42.92'N, 85°02.38'W; 600m, 20-23-XI-2001; ex. flight intercept trap; R. Brooks, CR 1B01 64 // [barcode]; SM0516903; KUNHM-ENT // *Euglossa; oleolucens*; Dressler ♂; Det I. Hinojosa-Díaz 2012" (1♂) SEMC; same as previous except barcode "SM0517052" (1♂) SEMC; Panama: "PANAMA:Chiriqui Prov.; La Fortuna. "Hydro. Trail"; 08°42'N, 82°14'W; 1150m. 23 V-9 VI 1995; J. Ashe, R. Brooks #156; ex. flight intercept trap // [barcode]; SM0041704; KUNHM-ENT // *Euglossa; gorgonensis*; Cheesman; det. R.W. Brooks 1996 [taxon name and last two digits of year handwritten] // *Euglossa; oleolucens*; Dressler ♂; Det I. Hinojosa-Díaz 2012" (1♂) SEMC; same as previous except only second identification label and barcode number "SM0041705" (1♂) SEMC.

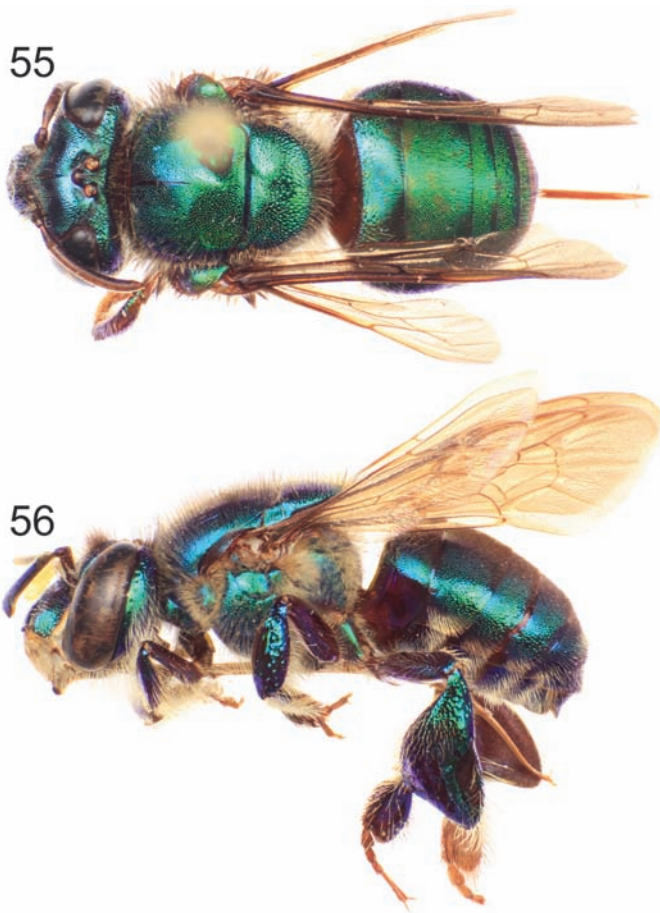
Comments.—Dressler (1978a) described *E. (A.) oleolucens* based on a few specimens from the Pacific slope of central to southern Costa Rica. The holotype for this species was not directly examined in this study but we had access to paratypes and to multiple, detailed images of the holotype, rendering the identity of the species unambiguous. Additionally, several males from the type locality were also available for direct examination of external and genitalic features. As originally described and evidenced by the numerous specimens from the type locality, males of *E. (A.) oleolucens* are at first sight very similar to the redder males of *E. (A.) gorgonensis* with which they are sympatric (Figs. 45–46). Upon closer examination it is evident that both species are not necessarily close within *Alloglossura*. The shape of the posterior mesotibial tuft of *E. (A.) oleolucens*, although with its own particularities, is reminiscent of those of *E. (A.) samperi*, *E. (A.) trinotata*, and *E. (A.) paisa*, to which (as stated by Ramírez, 2005, 2006) it is more closely allied. Beyond the Pacific slope of central and southern Costa Rica, specimens of *E. (A.) oleolucens* have a rather distinct coloration (Figs. 47–48). All of these specimens with faint golden-bronzy iridescence and noticeable blue-green coloration on different integumental areas were collected after the original description of *E. (A.) oleolucens* (*vide* Dressler, 1978a). Un-

like the case of intergradations of coloration for *E. (A.) gorgonensis*, the two morphs of *E. (A.) oleolucens* seem to be discrete. There are blue-green specimens from both north and south of the areas where the golden-bronzy specimens occur (Fig. 95), and no one exhibits seeming intergradations. Most specimens of the blue-green morph have been collected in flight intercept traps, which means the specimens were kept in fluids for some time before being prepared as dry mounts. Although there could be some coloration change due to the collection process, the integument tends to return to its original coloration after the specimens are completely dry; this is attested by the fact that a good number of the golden-bronzy specimens have also been collected in flight intercept traps, and their coloration matches that of the ones collected in flight or at flowers, so the differences in coloration of both morphs are not artificial. There is no doubt of the conspecificity between both morphs, as all other morphological features, including genital structures, are uniform among all specimens regardless of their color. As in the case of *E. (A.) gorgonensis*, additional collecting in different areas, as well as of females, will help to better understand the extent of color variation in this species. *Euglossa (A.) oleolucens* is only known from Costa Rica and western Panama (Fig. 95).

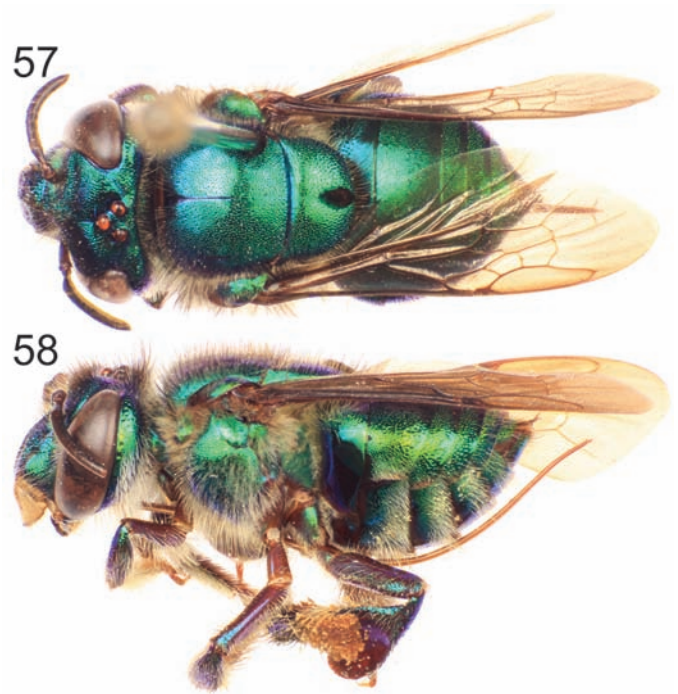
Euglossa (Alloglossura) fuscifrons Dressler
Figs. 55–65, 81, 86, 92–93, 95

Euglossa (Glossurella) fuscifrons Dressler, 1982: 131–140
131–140 [134]. Holotype ♂ (USNM, *visum*).

Diagnosis.—Labiomaxillary complex in repose surpassing tip of metasoma, in male by nearly length of mesoscutum (Figs. 55–56), in female comparable to length of mesoscutellum (Figs. 57–58); integument coloration in both sexes green, golden-bronzy iridescence all over, faint on head and mesosoma, noticeable on metasoma (especially in female), intermixed with blue-green (sometimes purple) iridescence that dominates face, mesoscutum, and mesoscutellum in both sexes, and metasomal terga in male (Figs. 55–58); male paraocular marks well developed, triangular, lower width occupying about half of horizontal section of epistomal sulcus, antennal scape with no ivory spot (or at most with a faint yellowish lateral spot) (Figs. 56, 59); clypeal disc in male with brown coloration covering most of surface between paramedial ridges (Fig. 59), in female covering a broad area along upper half of medial ridge (Fig. 60); male preocular area green with small purple spot on upper lateral section (Fig. 64); lower interorbital distance noticeably narrower than upper interorbital distance in both sexes (Figs. 59–60);



Figs. 55–56. *Euglossa (Alloglossura) fuscifrons* Dressler, male: 55. Dorsal habitus. 56. Lateral habitus.



Figs. 57–58. *Euglossa (Alloglossura) fuscifrons* Dressler, female: 57. Dorsal habitus. 58. Lateral habitus.

both sexes with labrum rather square, slightly wider than long; male with anterior mesotibial tuft oblong; posterior tuft simple, small, tear shaped (Figs. 61, 81); mesobasitarsus unmodified on inner surface; mesodistitarsus simple, with no projection on antero-distal angle; inner surface of male metatibia with small round depression devoid of setae; second metasomal sternum in male with no integumental modifications (Fig. 65); dorsal process of gonocoxite as broad as long, rounded, basal incision broadly concave (Fig. 86); lateral section of gonostylus with a concave ventral margin in some specimens (Fig. 92) and straight in others (Fig. 93), dorsal margin shallowly concave with no or very few setae (Figs. 92–93).

Description.—♂: *Structure.* Total body length 11.30 mm (10.37–12.22; n=5); labiomaxillary complex in repose surpassing tip of metasoma by about the length of mesoscutum (Figs. 55–56). Head length 2.63 mm (2.52–2.81; n=5), width 4.22 mm (4.07–4.37; n=5); upper interorbital distance 2.07 mm (2.00–2.13; n=5); lower interorbital distance 1.84 mm (1.78–1.93; n=5); upper clypeal width 1.17 mm (1.11–1.19; n=5); lower clypeal width 1.78 mm (1.70–

1.83; n=5); clypeal protuberance 0.78 mm (0.67–0.85; n=5); clypeal ridges as described for *E. (A.) samperi*; labrum rather square (slightly rectangular) on frontal view, length 1.05 mm (1.00–1.11; n=5), width 1.09 mm (1.04–1.15; n=5), labral ridges and labral windows as described for *E. (A.) gorgonensis*; intercellular distance 0.24 mm (0.22–0.29; n=5); ocellocular distance 0.61 mm (0.59–0.67; n=5); first flagellomere as long [0.37 mm (n=5)] as second and third flagellomeres combined [0.37 mm (n=5)]; length of malar area 0.07 mm (0.06–0.07; n=5). Mandible bidentate. Pronotal dorso-lateral angle as described for subgenus; intertegular distance 3.23 mm (3.19–3.33; n=5); mesoscutal length 2.60 mm (2.52–2.70; n=5); mesoscutellar length 1.34 mm (1.28–1.41; n=5); mesal area of mesoscutum slightly concave (shallower than in the four previously described species); posterior margin of mesoscutellum strongly convex (Fig. 55); mesotibial length 2.11 mm (1.93–2.22; n=5); mesobasitarsal spur present; mesobasitarsal length 1.88 mm (1.78–2.00; n=5), width 0.66 mm (0.63–0.67; n=5) (as measured at proximal posterior keel), posterior keel projected in an obtuse angle, inner mesobasitarsal surface even, unmodified, as described for *E. (A.) trinotata*; antero-distal angle of mesodistitarsus simple; metafemur as described for *E. (A.) samperi* (Fig. 62); metatibial shape as described for *E. (A.) samperi* (Fig. 63), metatibial anterior margin length 3.11 mm (2.96–3.33; n=5), ventral margin length 1.89 mm (1.70–2.07; n=5), postero-dorsal margin length 3.75 mm (3.63–3.85; n=5),

maximum metatibial thickness 0.87 mm (0.81–0.89; n=5); metatibial organ slit narrow, basal section oval, length 0.33 mm (0.30–0.37; n=5), distal section spur shaped, maximum width occupying about one-fourth of metatibial outer surface width (Fig. 62); metatibial inner surface with a depression as described for *E. (A.) samperi* albeit reduced to about half of the area occupied in *E. (A.) samperi* and shallower; metabasitarsal length 2.07 mm (1.93–2.22; n=5), mid-width 0.83 mm (0.74–0.89; n=5); metabasitarsal ventral margin oblique, convexly projected (Fig. 62). Forewing length 8.52 mm (8.15–8.89; n=5); jugal comb with 14–15 blades (n=5); hind wing with 17–22 hamuli (n=5). Maximum metasomal width 4.36 mm (4.22–4.52; n=5); second metasomal sternum with no integumental modifications (Fig. 65).

Coloration. General coloration as described for *E. (A.) trinotata* except as follows: paraocular ivory marks triangular, lower width occupying about half of horizontal section of epistomal sulcus (Figs. 56, 59); most specimens with no ivory spot on antennal scape, some (*vide* Comments) with a faint yellowish spot on upper lateral surface; brown coloration on clypeal disc as in *E. (A.) gorgonensis* (Fig. 59); preomaular spot as described for *E. (A.) gorgonensis* (Fig. 63); golden-bronzy iridescence weaker on mesosoma (including legs) and metasoma, blue-green coloration rather dominant (Figs. 55–56).

Sculpturing. General sculpturing as described for *E. (A.) samperi* except last three metasomal terga with punctures comparable in size to those on clypeus.

Vestiture. General vestiture as described for *E. (A.) samperi* except as follows: setae on mesoscutum and mesoscutellum slightly shorter; shape and setae coloration of anterior mesotibial tuft as in *E. (A.) gorgonensis* but dark setae restricted to narrow area along posterior margin (much wider in *E. [A.] gorgonensis*) (Figs. 61, 81); posterior metatibial tuft similar to that in *E. (A.) gorgonensis* but considerably smaller (about half as long as anterior tuft) (Figs. 61, 81); metatibial inner depression contiguous to basitarsal joint, seemingly covered with same setal pattern as remainder of inner surface, in some specimens setae in this area slightly smaller; second metasomal sternum unmodified (as in *E. [A.] gorgonensis*) (Fig. 65); metatibial organ slit closed uniformly with brown setae (Fig. 62).

Terminalia. Seventh metasomal sternum as described for *E. (A.) samperi*. Eighth metasomal sternum as described for subgenus. Gonocoxite as described for subgenus except dorsal process as long as broad, conspicuously rounded, basal incision broadly concave (Fig. 86); lateral section of gonostylus following general description for subgenus, although with some variation as follows: shape of ventral margin concave in some specimens (Fig. 92) and straight in others (Fig. 93), number of setae

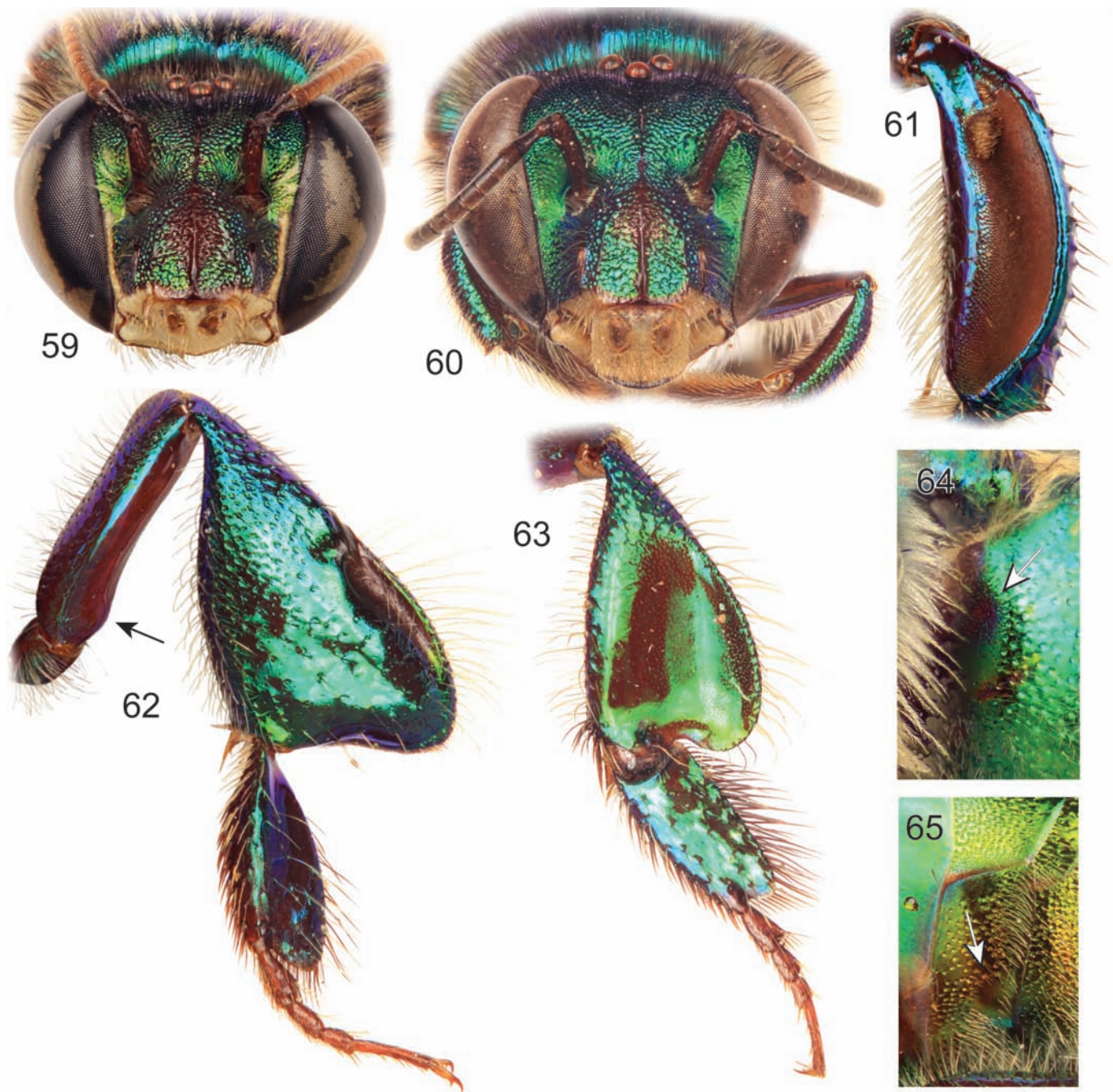
on dorsal margin variable, some specimens with no setae, others with only one (seemingly simple) and one specimen observed with two rows of four minutely-branched setae (Figs. 92–93).

♀ (**previously unknown**): **Structure.** Total body length 10.59 mm (10.52–10.74; n=3); labiomaxillary complex in repose surpassing metasomal tip by about the length of mesoscutellum (Figs. 57–58). Head length 2.52 mm (2.44–2.56; n=3); head width 4.20 mm (4.07–4.30; n=3); upper interorbital distance 2.14 mm (2.07–2.19; n=3); lower interorbital distance 2.05 mm (2.00–2.07; n=3); upper clypeal width 1.16 mm (1.11–1.19; n=3); lower clypeal width 1.82 mm (1.81–1.85; n=3); clypeal protuberance 0.82 mm (0.81–0.85; n=3); clypeal and labral ridges as in male, labral windows occupying slightly over one half of labral length, closest to upper margin; labrum slightly wider than long, length 1.01 mm (0.96–1.07; n=3), width 1.10 mm (1.07–1.11; n=3); intercellular distance 0.29 mm (0.26–0.30; n=3); ocellular distance 0.63 mm (0.63–0.64; n=3); length of first flagellomere [0.37 mm (0.33–0.41; n=3)] equal to combined length of second and third flagellomeres [0.37 mm (0.33–0.41; n=3)]; length of malar area 0.07 mm (n=3). Mandible tridentate. Pronotal lateral angle as in male; intertegular distance 3.26 mm (3.19–3.33; n=3); mesoscutal length 2.53 mm (2.44–2.59; n=3); mesoscutellar length 1.41 mm (n=3); posterior border of mesoscutellum as in male (Fig. 57); mesotibial length 2.06 mm (2.04–2.07; n=3); mesobasitarsal length 1.83 mm (1.70–1.93; n=3), maximum width 0.49 mm (0.44–0.52; n=3); metatibia triangular (scalene triangular) (Fig. 63), metatibial anterior margin length 3.01 mm (2.96–3.11; n=3); ventral margin length 1.59 mm (1.56–1.63; n=3); metatibial posterodorsal margin length 3.19 mm (3.04–3.26; n=3); metabasitarsus as described for subgenus (Fig. 63), length 1.55 mm (1.52–1.56; n=3), maximum width 0.74 mm (n=3). Forewing length 8.20 mm (7.85–8.59; n=3); hind wing with 19–20 hamuli. Maximum metasomal width 4.30 mm (4.22–4.37; n=3).

Coloration. General coloration as described for male except: brown coloration on clypeal disc restricted to contiguous areas along upper half of medial ridge. Paraocular marks, spot on antennal scape, and preomaular spot absent (Figs. 57–58, 60).

Sculpturing. As described for male except no differentiation on preomaular area (preomaular spot absent), and mesial areas of sterna as in females of other species.

Vestiture. As described for male (setal features on protarsi, meso- and metatibia are exclusive of male) except as follows: Mesoscutellar tuft ovoid, acute anteriorly, occupying slightly over half of mid-mesoscutellar length, composed of dense, dark, erect, multibranching (branches minute) setae (Fig. 57). Other features as described for female of *E. (A.) samperi*.



Figs. 59–65. *Euglossa (Alloglossura) fuscifrons* Dressler: 59. Facial aspect of male. 60. Facial aspect of female. 61. Outer surface of male mesotibia. 62. Outer view of male hind leg (arrow pointing to proximal metafemoral convexity). 63. Outer view of female hind leg. 64. Male preomalar area (arrow pointing to preomalar spot). 65. Section of male second metasomal sternum (arrow showing absence of integumental modifications).

Material examined.—*Colombia*: “Colombia; Putumayo; Puerto Asis; 11 II 1972 [date handwritten] // Helen Kennedy; colr. [underside] // 1,8-Cineole [underside] // PARATYPE; *Euglossa; fuscifrons* Dressler; R.L.Dressler, 1982 [type label, pink margin]” (1♂) SEMC; “COLOMBIA: Caqueta; Yuruyaco, 73k. sw; Floren-

cia 24.i.1979; M.Cooper; B.M. 1979-106” (1♂) NHML; “COLOMBIA: Caqueta; Yuruyaco, 73k. sw Flo-; rencia 31.i.1979; M.Cooper; B.M. 1979-106 [day handwritten]” (1♀) NHML; “COLOMBIA: Caqueta; Yuruyaco, 73k. sw; Floren- 22.i.1979; M.Cooper; B.M. 1979-106” (1♀) NHML; “COLOMBIA: Putu-; mayo, Mocoa; 10.viii.1978;

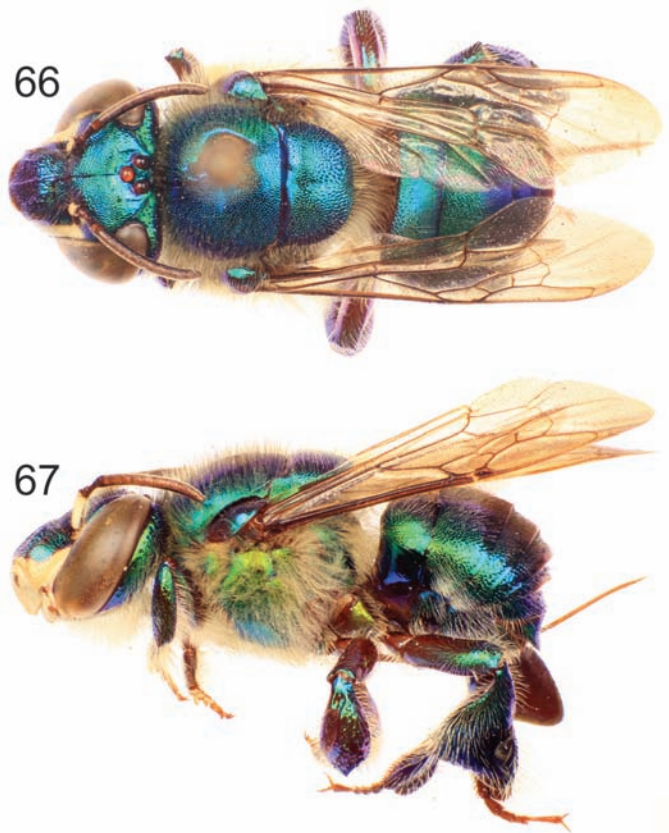
M.Cooper; B.M. 1978-431 [day handwritten]"; **Ecuador**: "ECUADOR: Napo; Vera Cruz; 3 II 1969 [all handwritten, except country and first three digits of year] // Cineole; D. Velástegui [handwritten] // HOLOTYPE; *Euglossa fuscifrons* Dressler; R.L.Dressler, 1982 [type label, fade red color] // USNM; 00534421; [barcode] [yellow label]" (1♂) USNM; "ECUADOR: Napo; Rio San Miguel; Cineole 197 [all handwritten, except country and last three digits] // H. Kennedy; 4 II 1971 [handwritten on underside] // PARATYPE; *Euglossa fuscifrons* Dressler; R.L.Dressler, 1982 [type label, pink margin]" (1♂) SEMC; "Cordillera Central; Napo, Ecuador; D. Velastigui; Flying 2/15/1969 [first and last rows handwritten] // E. Sp. NUM 5) [fading ink]" (1♂) SEMC; " ECUADOR. Napo; September 1987; Dressler, Wille; Whitten, Williams // p-dimethoxy; benzene" (2♂♂) SEMC, FLMNH; "ECUADOR: Mor.-Stgo.; E. Patuca; 27-31 Aug.; 1987; Dressler, Hills; Whitten, Williams // p-dimethoxy; benzene" (2♂♂) SEMC; same data except attractant "cineole" (1♂) SEMC; "ECUADOR: Morona-; Santiago, Cord, Cutucu; c.6km.e.Macas.c.1000m; 18.x.1978; M.Cooper; B.M. 1979-20 [day handwritten]" (1♂) NHML; **Peru**: "PERU: Depto. Huanuco; Tingo Maria; Cueva de las Pavas; F. W. Stiles // Cineole // PARATYPE; *Euglossa fuscifrons* Dressler; R.L.Dressler, 1982 [type label, pink margin]" (1♂) SEMC; "PERU: Dept. Loreto; 1.5 km N. Teniente L 1.5 km N. Teniente Lopez; 19 July 1992 230-305 m; Richard Leschen #141; ex: eucalyptus oil/methyl; salicylate attractants // *E. (Glossurella) fuscifrons*; Dressler 1982; Det.M.L.Oliveira, 2000 [handwritten]" (1♂) SEMC.

Comments.—While all other species in *Alloglossura* are restricted to southern Central America or to areas on the Andean western slope in northwestern South America (but see comments on *E. [A.] paisa*), *E. (A.) fuscifrons* is the only one present in the Amazon Basin (Fig. 95). It shares a series of features with *E. (A.) gorgonensis*, notably the shape of the mesotibial posterior tuft, the absence of integumental modifications on the second metasomal sternum, and the broad brown coloration of the clypeal disc, all in the male. Coloration is also similar between both species, if the comparison is restricted to those specimens of *E. (A.) gorgonensis* from Colombia (southernmost distribution for the aforementioned species). In terms of coloration, *E. (A.) fuscifrons* is rather uniform along its distribution, although one Ecuadorian specimen is noticeably darker than all other examined individuals, including others from the same locality. We have described the previously unknown female based on two specimens from the Amazon Basin of Colombia. As with *E. (A.) gorgonensis* the females are easily associated with males (Figs. 55-63).

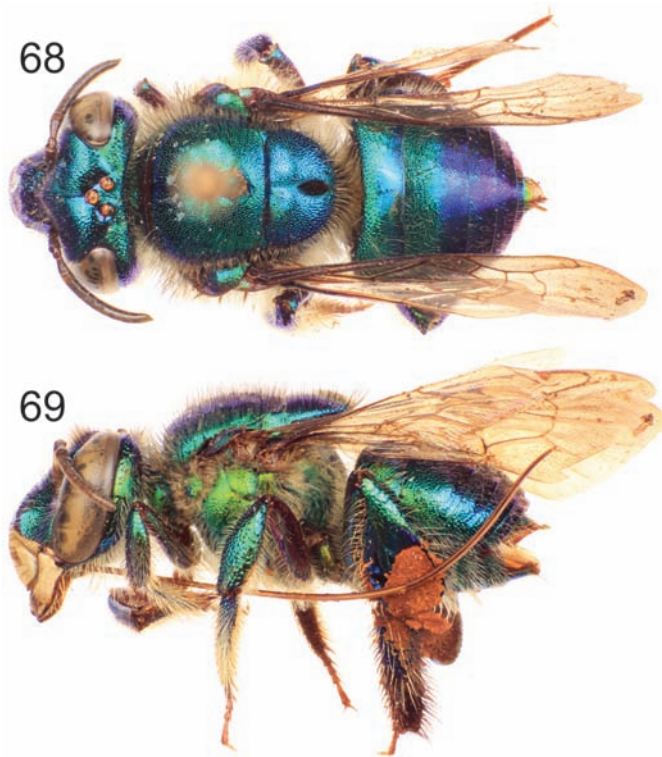
Euglossa (Alloglossura) nigrosignata Moure
Figs. 66-76, 82, 87, 94-95

Euglossa (Glossura) nigrosignata Moure, 1967: 227-247 [234]. Holotype ♂ (USNM, photographs of type provided).

Diagnosis.—Labiomaxillary complex in repose surpassing tip of metasoma, in male by about length of mesoscutellum (Figs. 66-67), in female by about length of one metasomal segment (Figs. 68-69); integument coloration in both sexes dark green to dark blue, with some golden-bronzy iridescence, especially noticeable on mesepisternum, blue-green (sometimes purple) iridescence all over but strong on metasomal terga (Figs. 66-69); male paracocular marks very well developed, lower width occupying entire area between compound eye and clypeal disc, antennal scape completely ivory colored on frontal and lateral surfaces (Figs. 66-67, 70); clypeal disc in both sexes with no brown coloration (Figs. 70-71); male preomalar area largely brown (Fig. 75); lower interorbital distance marginally narrower than upper interorbital distance in male (Fig. 70), inversed (lower marginally wider than upper) in female (Fig. 71); both sexes with labrum slightly



Figs. 66-67. *Euglossa (Alloglossura) nigrosignata* Moure, male: 66. Dorsal habitus. 67. Lateral habitus.



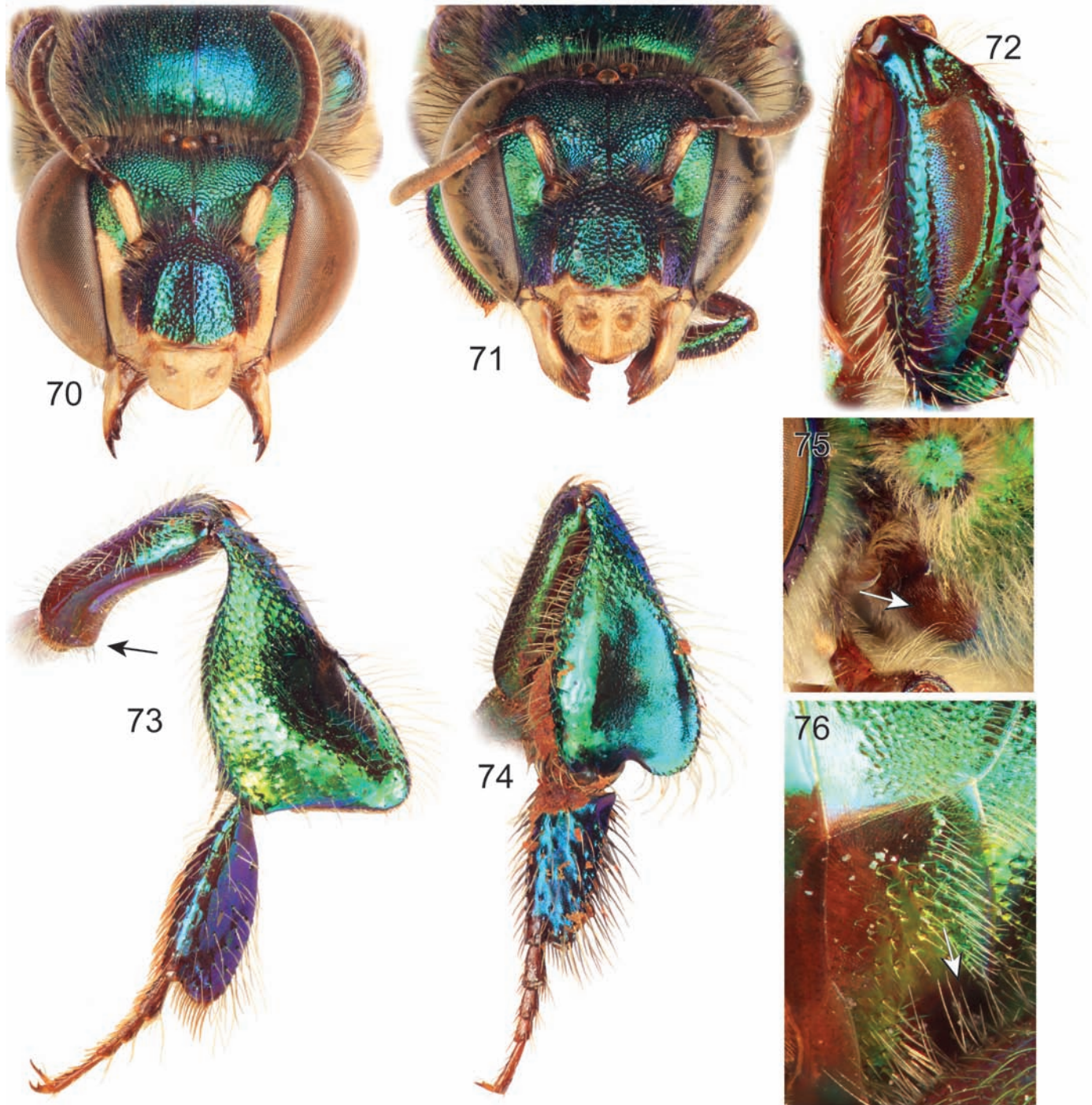
Figs. 68–69. *Euglossa (Alloglossura) nigrosignata* Moure, female: 68. Dorsal habitus. 69. Lateral habitus.

longer than wide; male with mesotibial features on outer surface reduced (Fig. 72), anterior tuft comma shaped; posterior tuft vestigial, at most present as a minute setose spot (Figs. 72, 82); male mesobasitarsus with carinate elevation on distal third of inner surface; mesodistitarsus simple, with no projection on antero-distal angle; inner surface of male metatibia even, with no evident depression; second metasomal sternum in male with no integumental modifications (Fig. 76); dorsal process of gonocoxite broad and short, basal incision concave (Fig. 87); lateral section of gonostylus with large, convex expansion on dorsal margin, bearing no setae on that area (Fig. 94).

Description.—♂: *Structure.* Total body length 12.04 mm (11.85–12.22; $n=2$); labiomaxillary complex in repose surpassing tip of metasoma by about the length of mesoscutellum (Figs. 66–67). Head length 2.83 mm (2.81–2.85; $n=2$), width 4.65 mm (4.63–4.67; $n=2$); upper interorbital distance 2.21 mm (2.19–2.22; $n=2$); lower interorbital distance 2.15 mm ($n=2$); upper clypeal width 1.26 mm (1.19–1.33; $n=2$); lower clypeal width 2.04 mm ($n=2$); clypeal protuberance 1.02 mm (1.00–1.04; $n=2$); clypeal ridges as described for *E. (A.) samperi*; labrum slightly longer than wide, length 1.30 mm (1.26–1.33; $n=2$), width 1.21 mm (1.19–1.22; $n=2$), labral ridges as described for *E. gorgonensis*; labral windows ovoid, occupying slightly less than half the labral length; interocellar distance 0.27

mm (0.26–0.27; $n=2$); ocellocular distance 0.67 mm ($n=2$); first flagellomere slightly shorter [0.37 mm ($n=2$)] as second and third flagellomeres combined [0.44 mm ($n=2$)]; length of malar area 0.09 mm (0.07–0.11; $n=2$). Mandible bidentate. Pronotal dorso-lateral angle as described for subgenus; intertegular distance 3.56 mm (3.48–3.63; $n=2$); mesoscutal length 2.93 mm (2.89–2.96; $n=2$); mesoscutellar length 1.56 mm ($n=2$); mesal area of mesoscutum with a very shallow concavity (shallower than in *E. [A.] fuscifrons*); posterior margin of mesoscutellum strongly convex (Fig. 66); meso and meta legs characteristically enlarged, with a much stronger build than in the other species of the subgenus, particularly mesotibia (Figs. 67, 72); mesotibial length 2.63 mm (2.59–2.67; $n=2$); mesotibial spur absent, albeit socket present on area where spur is present in other species; mesobasitarsal length 2.33 mm (2.22–2.44; $n=2$), width 0.78 mm (0.74–0.81; $n=2$) (as measured at proximal posterior keel), posterior keel projected in a noticeable obtuse angle, inner mesobasitarsal surface with elevation and carina as in *E. (A.) samperi* although somewhat not as prominent; antero-distal angle of mesodistitarsus simple; metafemur as described for *E. (A.) samperi*, but additionally to the prominent proximal convexity on inner-ventral margin (the most notorious of all species in the subgenus), also enlarged on its distal end making it look strong and with an inner ventral margin concave (Fig. 73); metatibial shape in general as described for *E. (A.) samperi* but anterior margin notoriously convex (Fig. 73), metatibial anterior margin length 3.30 mm (3.11–3.48; $n=2$), ventral margin length 2.04 mm (1.93–2.15; $n=2$), postero-dorsal margin length 3.93 mm (3.85–4.00; $n=2$), maximum metatibial thickness 0.81 mm ($n=2$); metatibial organ slit narrow, basal section oval, length 0.28 mm (0.26–0.30; $n=2$), distal section spur shaped, maximum width occupying about one-fourth of metatibial outer surface width (Fig. 73); metatibial inner surface even, with no depression; metabasitarsal length 2.30 mm ($n=2$), mid-width 0.95 mm (0.93–0.96; $n=2$); metabasitarsal ventral margin slightly oblique, convexly projected (Fig. 73). Forewing length 8.97 mm (8.89–9.04; $n=2$); jugal comb with 13–14 blades ($n=2$); hind wing with 19–21 hamuli ($n=2$). Maximum metasomal width 4.78 mm (4.67–4.89; $n=2$); second metasomal sternum with no integumental modifications (Fig. 76).

Coloration. General coloration as described for the blue morph of *E. (A.) samperi* with following remarks: paraocular ivory marks very well developed, somewhat triangular, on their lower margin covering the entire area between compound eye and clypeal disc, and on their upper end reaching clearly above antennal socket; antennal scape completely covered by ivory coloration on its frontal and lateral (outer) surfaces (Figs. 66–67, 70); malar area completely ivory; clypeal disc concolorous with oth-



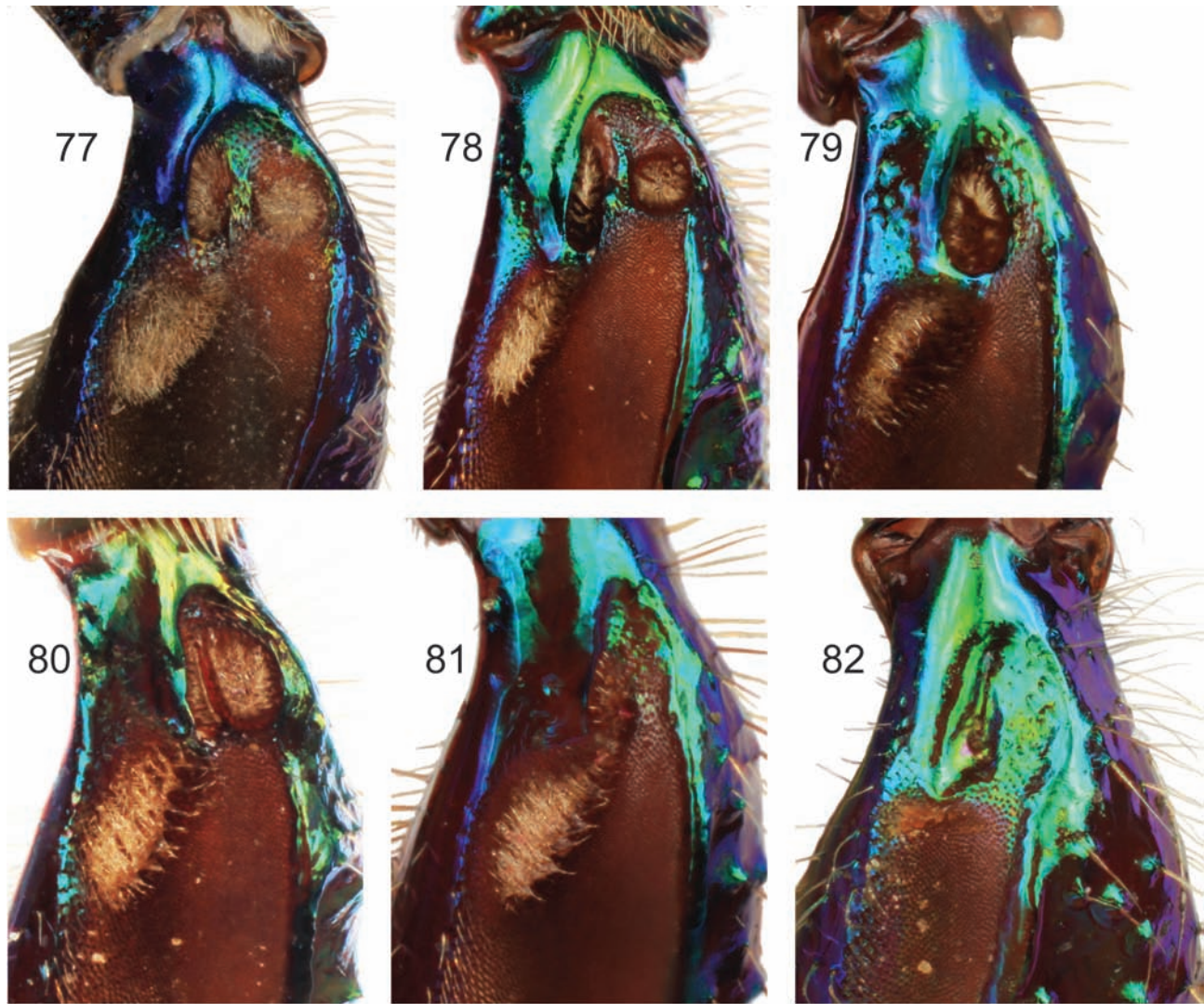
Figs. 70–76. *Euglossa (Alloglossura) nigrosignata* Moure: 70. Facial aspect of male. 71. Facial aspect of female. 72. Outer surface of male mesotibia. 73. Outer view of male hind leg (arrow pointing to proximal metafemoral convexity). 74. Outer view of female hind leg. 75. Male premaular area (arrow pointing to premaular spot). 76. Section of male second metasomal sternum (arrow showing absence of integumental modifications).

er metallic facial areas (brown coloration as seen in other species absent) (Fig. 70); premaular area similar to that of *E. (A.) trinotata*, almost completely brown (Fig. 75).

Sculpturing. General sculpturing similar to that of *E. (A.) gorgonensis* (larger punctures on last three metasomal

terga).

Vestiture. General vestiture as described for *E. (A.) samperi* albeit lighter all over (still two structurally distinguishable kinds of setae, but very close in coloration), other exceptions as follows: microtrichia on metatibia



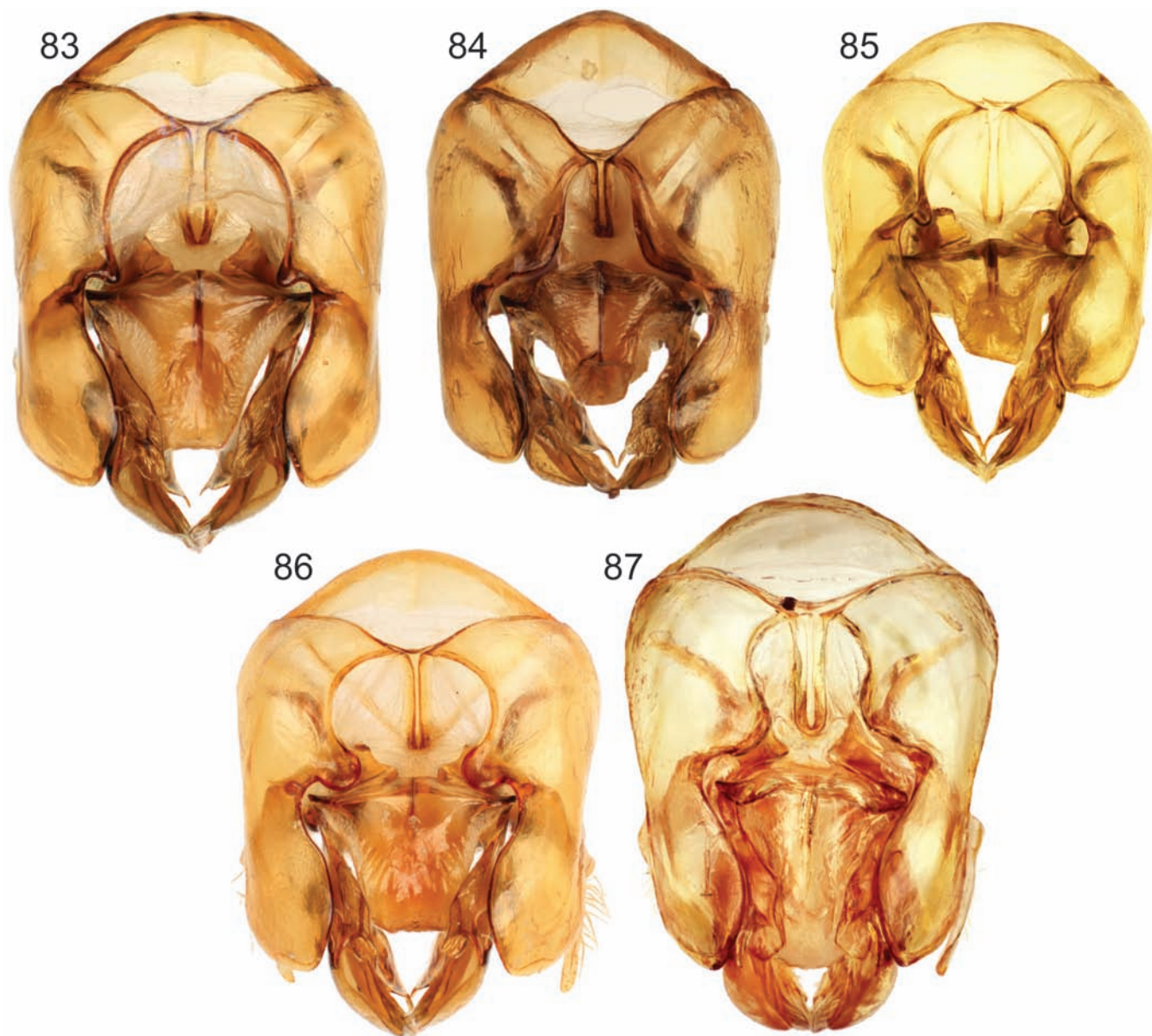
Figs. 77–82. Detail of mesotibial tufts of males of species of *Alloglossura*: 77. *Euglossa (Alloglossura) samperi* Ramírez. 78. *E. (A.) trinotata* Dressler. 79. *E. (A.) gorgonensis* Cheesman. 80. *E. (A.) oleolucens* Dressler. 81. *E. (A.) fuscifrons* Dressler. 82. *E. (A.) nigrosignata* Moure.

(velvety area) reduced, about half as wide than in all other species in subgenus, and largely separated from distal margin of mesotibia (Fig. 72); metatibial tufts also noticeably reduced, anterior tuft comma shaped, with few fulvous setae directed posteriorwards, posterior tuft vestigial, present only as a minute setose spot (equivalent to anterior lobe of tuft as described in other species) sitting on a broad horseshoe-shaped cavity (Figs. 72, 82); metatibial inner surface evenly setose all over; appressed setae on metasomal terga sparser and more erect than in *E. (A.) samperi*; second metasomal sternum unmodified (as in *E. (A.) gorgonensis* and *E. (A.) fuscifrons*) (Fig. 76); metatibial organ slit closed uniformly with brown setae (Fig. 73).

Terminalia. Seventh metasomal sternum as described for *E. (A.) samperi*. Eighth metasomal sternum as described for subgenus. Gonocoxite as described for subgenus

except dorsal process broad, similar to that of *E. (A.) gorgonensis*, basal incision shallowly concave (Fig. 87); lateral section of gonostylus compressed as described for the subgenus, but with a characteristic, large, convex blade-like expansion on dorsal margin bearing no setae on that sector (Fig. 94).

♀: *Structure*. Total body length 11.85 mm; labiomaxillary complex in repose surpassing metasomal tip by about the length of one metasomal segment (Figs. 68–69). Head length 3.11 mm; head width 4.52 mm; upper interorbital distance 2.22 mm; lower interorbital distance 2.30 mm; upper clypeal width 1.19 mm; lower clypeal width 2.00 mm; clypeal protuberance 0.96 mm; clypeal and labral ridges as in male, labral windows slightly bigger than in male; labrum slightly longer than wide, length 1.26 mm, width 1.19 mm; interocellar distance 0.28 mm;



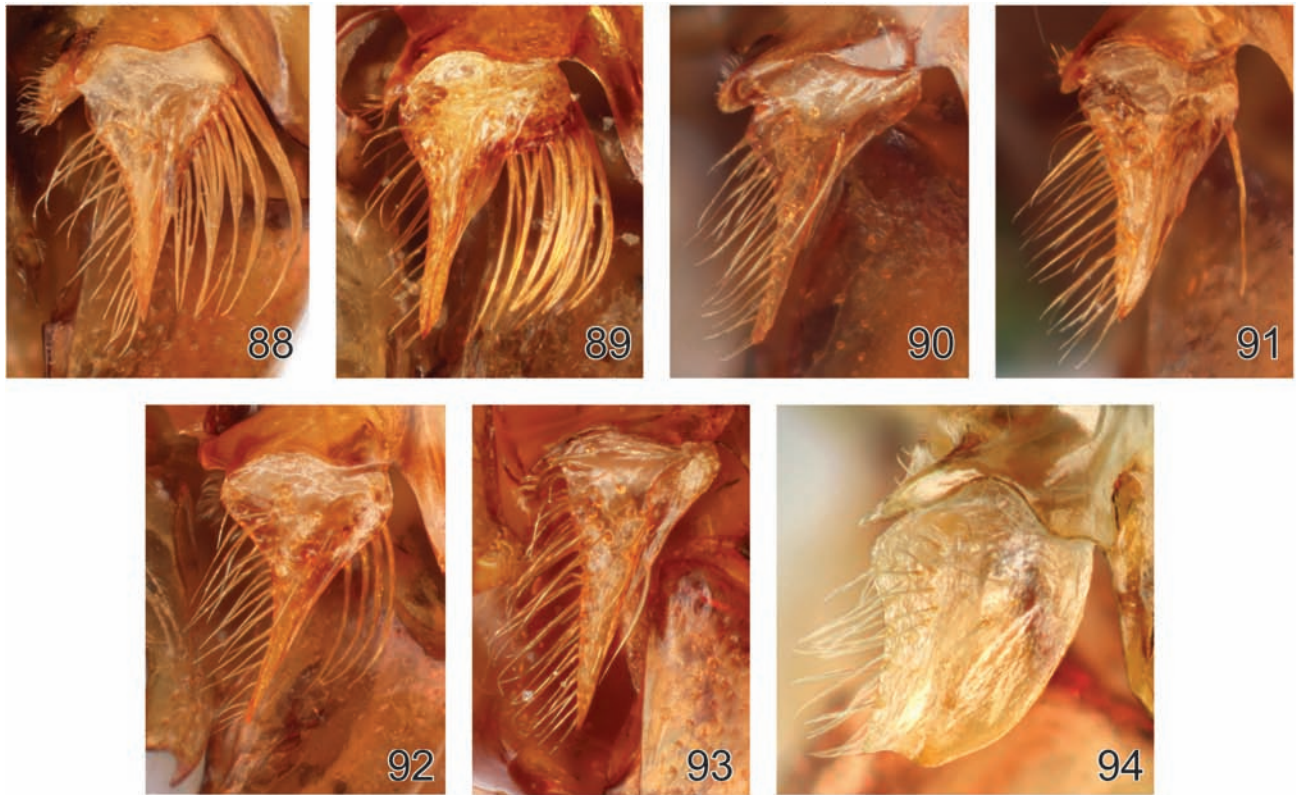
Figs. 83–87. Dorsal view of genital capsule of species of *Alloglossura*: 83. *Euglossa (Alloglossura) trinotata* Dressler. 84. *E. (A.) gorgonensis* Cheesman. 85. *E. (A.) oleolucens* Dressler. 86. *E. (A.) fuscifrons* Dressler. 87. *E. (A.) nigrosignata* Moure.

ocellocular distance 0.67 mm; length of first flagellomere (0.37 mm) equal to combined length of second and third flagellomeres (0.37 mm); length of malar area 0.07 mm. Mandible tridentate. Pronotal lateral angle as in male; intertegular distance 3.41 mm; mesoscutal length 2.89 mm; mesoscutellar length 1.48 mm; posterior border of mesoscutellum as in male (Fig. 68); mesotibial length 2.30 mm; mesobasitarsal length 1.93 mm, maximum width 0.59 mm; metatibia triangular (scalene right triangular) (Fig. 74), metatibial anterior margin length 3.26 mm; metatibial ventral margin length 1.63 mm; metatibial posterodorsal margin length 3.41 mm; metabasitarsus as described for

subgenus (Fig. 74), length 2.15 mm, maximum width 0.78 mm. Forewing length 8.81 mm; hind wing with 19–20 hamuli. Maximum metasomal width 4.67 mm.

Coloration. In general as described for male (Figs. 68–69), except: paraocular marks absent; antennal scape with ivory-yellowish spot covering upper half of lateral surface and contiguous anterior surface (Fig. 71); preomalar area concolorous (slightly lighter) with remainder of mesepisternum.

Sculpturing. As described for male but slightly denser on metasomal terga, no differentiation on preomalar area (preomalar spot absent), and presence of smooth



Figs. 88–94. Detail lateral section of gonostylus of species of *Alloglossura*: 88. *Euglossa (Alloglossura) samperi* Ramírez. 89. *E. (A.) trinotata* Dressler. 90. *E. (A.) gorgonensis* Cheesman. 91. *E. (A.) oleolucens* Dressler. 92. *E. (A.) fuscifrons* Dressler (variety with concave ventral margin and setal rows on dorsal margin). 93. *E. (A.) fuscifrons* (variety with straight ventral margin and dorsal margin with scarce setae). 94. *E. (A.) nigrosignata* Moure.

areas on mesial sections of metasomal sterna.

Vestiture. As described for *E. (A.) samperi* (i.e., matching most vestiture features of male of *E. [A.] samperi*), with sharp distinction in coloration between two structurally different kinds of setae present in most body areas; other vestiture features differ as follows: Mesoscutellar tuft ovoid, occupying slightly less than half of mid-mesoscutellar length, composed of dense, dark, erect, multibranch (branches minute) setae (Fig. 68). Other features as described for female of *E. (A.) samperi*.

Material examined.—Panama: “El Valle, Cocle; Panama; 5Dec1968 [all handwritten] // NH Williams // methyl; salicylate [handwritten on underside] // *Euglossa; nigrosignata* [handwritten on underside]” (1♂) FLMNH; “PANAMA: Pma.; Cerro Jefe; 27 XII 1967; R.L.Dressler 786 [day, month and last three digits handwritten] // *Euglossa; nigrosignata* Moure; det. R.L.Dressler 1968 [last digit of year handwritten]” (1♂) FLMNH; “PANAMA: Pma.; Cerro Campana; 26 VI 1968; R.L.Dressler 1019 [day, month and last four digits handwritten] // *Besleria; 3520* [handwritten]” (1♀) FLMNH.

Comments.—The particular morphology of the male facial ivory colored areas, mesotibia, premaular spot,

and lateral section of the gonostylus (Figs. 70, 72, 75, 94), make this species very distinctive in the subgenus. Type material (holotype) was examined only as photographs and the specimens available for direct examination were unambiguously assigned to the species owing to the strong morphological peculiarities of the species. The labiomaxillary complex of *E. (A.) nigrosignata* is just slightly shorter than that of *E. (A.) trinotata*, so it is notably long, a feature used by Moure (1967) to include it in *Glossura*, as this subgenus was erected to encompass all robust *Euglossa s. l.* with notably long mouthparts (Cockerell, 1917); however, it lacks the “bigibbous scutellum”, a feature also employed by Cockerell (1917) when creating *Glossura*. Dressler (1982) included *E. (A.) nigrosignata* in *Glossurella* as part of the “gorgonensis group”, due to shared punctuation, vestiture, and male metatibial features. Superficially, this species bears some resemblance to members of *Glossuropoda* Moure, as species of that subgenus also have an enlarged male mesotibia and the morphology of the male metatibia is quite similar. Based on the latter, Roubik (2004) added *E. (A.) nigrosignata* to *Glossuropoda*. Roubik’s position was not supported in the phylogenetic analyses (Hinojosa-Díaz, 2010). The characters alluded

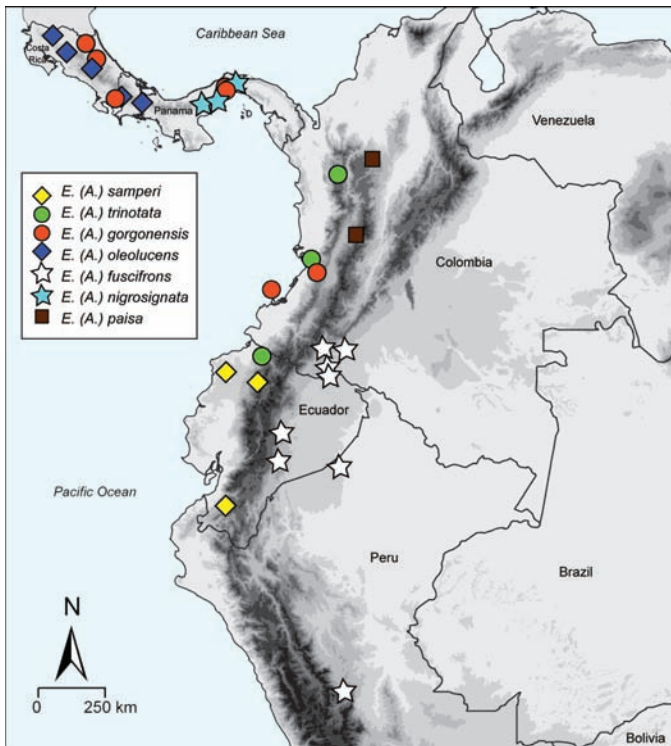


Fig. 95. Collection localities for species of *Alloglossura*. Locality points are based on examined specimens except those for *E. (A.) paisa* which were extracted from Ramírez (2005).

to by Dressler (1982) when allying the species to the “*gorgonensis*” group, plus numerous others like the structure of the prothorax, metatibial tufts, and genitalic features, unambiguously place *E. nigrosignata* as part of *Alloglossura* (Hinojosa-Díaz, 2010). The species is morphologically closer to *E. (A.) gorgonensis* and *E. (A.) fuscifrons* than to other species in the subgenus, sharing with them a similar structure of the male mesotibial posterior tuft and the absence of integumental modifications on the second metasomal sternum. The species is known from very few specimens from central Panama (Fig. 95), although unconfirmed records from Colombia have been cited (Roubik, 2004).

Euglossa (Alloglossura) paisa Ramírez

Euglossa (Glossurella) paisa Ramírez, 2005: 51–60 [53]. Holotype ♂ (IAHC, photographs of type provided).

Diagnosis [based on male characters as described and illustrated by Ramírez (2005, 2006)].—Labiomaxillary complex in repose reaching tip of metasoma (slightly surpassing it seemingly); integument coloration predominantly green with strong blue-green highlights all over, especially noticeable on face, mesoscutum, mesoscutellum, legs, and first four metasomal terga, otherwise inter-

mixed with golden iridescence; paraocular ivory marks absent, antennal scape with no ivory spot (few specimens with faint small marks); clypeal disc seemingly with no notorious brown coloration between paramedial ridges (concolorous with metallic surrounding areas); preomalar area seemingly dark violet, contrasting with green lateral mesepisternal region; lower interorbital distance noticeably narrower than upper interorbital distance; anterior mesotibial tuft oblong, posterior tuft bilobed, sitting in horseshoe-shaped cavity, anterior lobe large, comparable in size to anterior tuft, posterior lobe round, lobes separated by integumental crease; second metasomal sternum in male with two shallow semicircular depressions, lined with setae; dorsal process of gonocoxite triangular (similar to that of *E. trinotata*), basal incision broadly concave.

Material examined.—Colombia: “Holotype: *Euglossa paisa* Ramirez [type label, red colored paper, handwritten] // TA125 III-30-2003; Anori, Antioquia; Colombia Methyl; Salicylate leg. T.Arias // IAvH'E 107053” (1♂) IAHC.

Comments.—Despite being denied direct access to any specimens, the original description (Ramírez, 2005), plus the detailed photomicrographs of the holotype supplied by IAHC, provide sufficient descriptive and illustrative characters to consider *E. (A.) paisa* as a distinctive species and easily classified within *Alloglossura*. The species is distinctive in terms of coloration, structure of the posterior mesotibial tuft, and distribution. Some features observed in other species as here treated are, however, not mentioned in the description and not observable in the available images, such as the structure of the inner surface of the mesobasitarsus and metatibia. The genitalic features were described and illustrated separate from the original establishment of the species, and instead together with the subsequent description of *E. (A.) samperi* (vide Ramírez, 2006). Based on the morphology of the mesotibial posterior tuft and the modifications on the second metasomal sternum, it seems as if *E. (A.) paisa* is more closely allied to *E. (A.) trinotata* and *E. (A.) samperi*. The localities where the species has been collected are also unique within *Alloglossura*; it occupies slightly higher elevations than *E. (A.) samperi* in a distinctive region (Cordillera Central in Colombia) by comparison with other species in the group, most of them found on the Pacific Andean slope and *E. (A.) fuscifrons* on the Amazonian side of the Andes (Fig. 95).

PHYLOGENETIC ANALYSIS

A phylogenetic analysis for the subgenus was undertaken based on external morphology of the males, including some genitalic features. The seven species here considered as part of the subgenus were included in the

analysis, although for *E. (A.) paisa*, where material was not available to us, we included only those characters explicitly stated in the original description (Ramírez, 2005), in the subsequent paper describing the genitalic structures (Ramírez, 2006), and those observed in detailed photographic images of the holotype, with the remaining traits coded as “unknown”. Five species of closely related groups within *Euglossa s. l.* were added to the matrix as outgroups, with *E. (Euglossella) decorata* Smith as the most distant and basal outgroup (Table 2). The following 19 characters were coded for the analysis:

1. Eighth metasomal sternum, shape of posterior section: (0) with prominent lobes (lateral margins noticeably concave); (1) triangular, with no noticeable lobes (lateral margins straight).
2. Gonostylus, structure of lateral section: (0) blade like, compressed in sagittal view, so inner and outer surfaces are parallel; (1) thickened and membranous, inner surface appearing obliquely concave; (2) thickened, inner surface appearing convex.
3. Pronotal dorsolateral angle, structure: (0) with a lamellar or prong-like projection; (1) truncate and broadened anterolaterally; (2) obliquely obtuse, with no broadening.
4. Upper interorbital distance [UID] vs. lower interorbital distance [LID]: (0) UID as wide as LID; (1) UID wider than LID; (2) UID narrower than LID.
5. Mesoscutum length vs. mesoscutellum length; (0) mesoscutum more than twice as long as mesoscutellum (shorter mesoscutellum); (1) mesoscutum less than twice as long as mesoscutellum (longer mesoscutellum).
6. Metafemur, proximal convexity (knob) on ventral margin of inner surface: (0) present, (1) absent.
7. Paraocular ivory marks: (0) absent or vestigial; (1) present, lower width around one-third of horizontal section of epistomal sulcus or slightly more, but never

Table 2. Taxa included in the phylogenetic analysis of *Alloglossura*.

OUTGROUPS	
<i>Euglossa (Euglossella) decorata</i>	Smith
<i>E. hyacinthina</i>	Dressler*
<i>E. williamsi</i>	Hinojosa-Díaz and Engel*
<i>E. (Glossurella) bursigera</i>	Moure
<i>E. (G.) stilbonota</i>	Dressler
INGROUP	
<i>E. (Alloglossura) samperi</i>	Ramírez
<i>E. (A.) trinotata</i>	Dressler
<i>E. (A.) gorgonensis</i>	Cheesman
<i>E. (A.) oleolucens</i>	Dressler
<i>E. (A.) fuscifrons</i>	Dressler
<i>E. (A.) nigrosignata</i>	Moure
<i>E. (A.) paisa</i>	Ramírez

* Species presently without subgeneric assignment, although considered as “*Glossurella*” under traditional infrageneric classifications (considered herein as subgenus *incertae sedis*).

- half of it; (2) present, lower width covering half or more of horizontal section of epistomal sulcus, but never covering it all; (3) present, covering entire lateral area between clypeus and compound eye.
8. Antennal scape spot: (0) absent; (1) faint on lateral area; (2) covering entire anterior and lateral surfaces; (3) covering only anterior surface.
9. Clypeal macula (brown coloration on clypeal disc): (0) absent; (1) present only on contiguous areas to upper half of medial clypeal ridge; (2) present, covering most of surface between medial and paramedial clypeal ridges on upper section.
10. Preomalar spot: (0) present, restricted to upper lateral area; (1) present, covering most of preomalar area.
11. Posterior mesotibial tuft shape: (0) horseshoe shaped, with two distinctive lobes (sometimes setae absent, but integumental concavity evident); (1) entire, or

Table 3. Data matrix for relationships among species of *Alloglossura*. Ingroup species are listed in boldface; subset polymorphisms are separated by a comma, non-applicable characters represented by an en-dash (–), and missing information represented by an interrogative mark (?).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>E. decorata</i>	0	2	0	0,1	0	1	2	3	–	1	1	–	0	0	0	1	1	1	0
<i>E. hyacinthina</i>	1	1	1	0	0	1	1	2	0	1	1	–	0	0	1	1	1	1	0
<i>E. williamsi</i>	1	1	1	0	0	1	1	1	0	2	1	–	0	0	0	0	2	1	2
<i>E. bursigera</i>	1	1	1	0	0	1	1	2	0	1	1	–	0	0	0	1	2	1	0
<i>E. stilbonota</i>	0	1	1	1	0	0	2	2	1	1	0	0	1	0	1	1	1	1	0
<i>E. (A.) samperi</i>	0	0	2	1	1	0	1	0,1	1	0	0	0	1	1	1	1	1	1	0
<i>E. (A.) trinotata</i>	0	0	2	0	1	0	1	1	1	1	0	0	0	0	1	1	1	1	1
<i>E. (A.) oleolucens</i>	0	0	2	1	1	0	0	0	2	0	0	0	0	0	1	1	0	0	1
<i>E. (A.) gorgonensis</i>	0	0	2	1	1	0	0	0	2	0	0	1	0	0	0	0	1	0	2
<i>E. (A.) fuscifrons</i>	0	0	2	1	1	0	2	0,1	2	0	0	1	0	0	0	0	1	0	0
<i>E. (A.) nigrosignata</i>	0	0	2	0	1	0	3	2	0	1	0	1	1	0	0	0	2	0	2
<i>E. (A.) paisa</i>	0	0	2	?	?	0	0	0	?	?	0	?	?	0	?	1	?	?	1

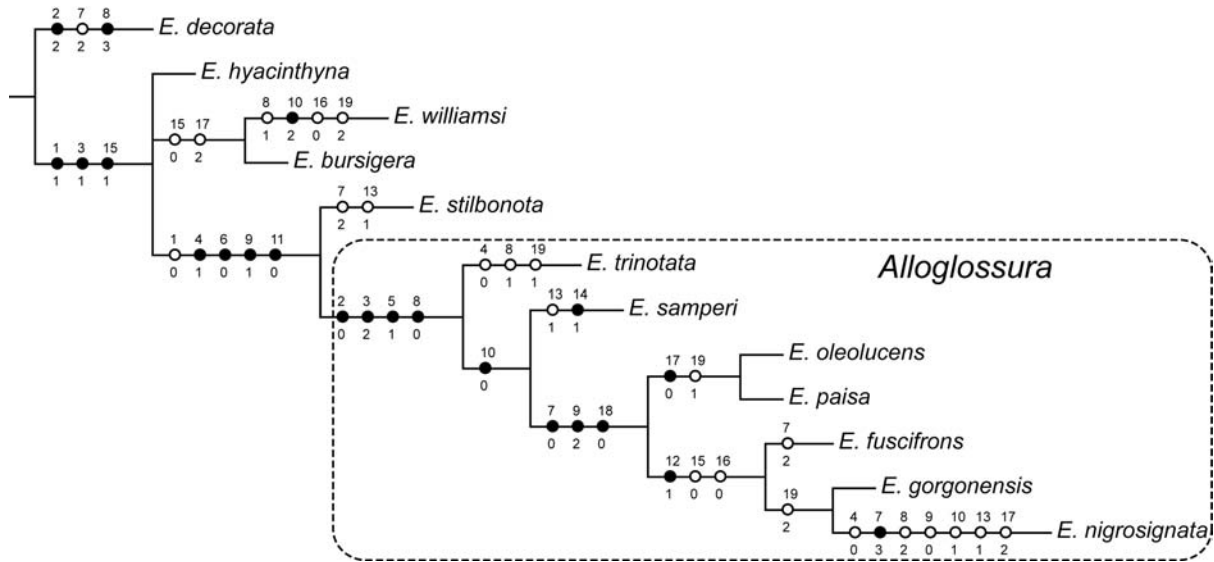


Fig. 96. Strict consensus of 2 most parsimonious trees produced by the phylogenetic analysis (character changes from fast optimization; L = 45 steps, CI = 64, RI = 71), with outgroup species excluded from the dashed frame. Black circles represent unreversed changes; white circles represent homoplastic character transitions; character numbers indicated above the branch, character states below.

- with some minimal setal differentiation as in lobes; (2) absent.
12. Posterior lobe on posterior metatibial tuft: (0) present as noticeable setose patch, either round or oval; (1) absent, only integumental concavity present.
 13. Mesobasitarsus, inner surface: (0) unmodified (no carinate elevation); (1) with a noticeable elevation and carina on distal half.
 14. Mesodistitarsus, antero-distal angle: (0) unmodified (not projected); (1) with a noticeable claw or spur-like integumental projection.
 15. Metatibial inner surface: (0) uniform, with no concavities; (1) with a noticeable concavity on area near basitarsal joint.
 16. Second metasomal sternum, integumental modifications: (0) absent; (1) present as Ω -like or U-like shallow depressions.
 17. Gonostylar lateral section, dorsal margin shape: (0)

straight; (1) concave; (2) convex.

18. Gonostylar lateral section, setae on dorsal margin: (0) absent or very few; (1) present and dense.
19. Gonocoxite, shape of dorsal process: (0) rounded, as broad as long; (1) triangular (acute) as broad as long; (2) blunt, broader than long.

Codings are provided in Table 3. The matrix was created in and run through the WinClada interface (Nixon, 1999), with the actual analyses running in Nona (Goloboff, 1999). For the analysis all characters were set as non-additive and considered of equal weights, using the heuristics module as well as the Ratchet module, the latter with 20,000 iteration/rep. Two equally parsimonious trees differing only in arrangement of outgroup taxa were recovered of length 45, consistency index (CI) 64, and retention index (RI) 71. The strict consensus of these is depicted in Figure 96.

DISCUSSION

The availability of phylogenetic hypotheses for *Euglossa s. l.* (Hinojosa-Díaz, 2010; Ramírez et al., 2010), have brought a new understanding as to the interrelationships within the genus and the circumscription of the infrageneric units. One of the notable features of topologies derived from both morphology (Hinojosa-Díaz, 2010) and DNA sequences (Ramírez et al., 2010), is the paraphyly of *Glossurella* as defined by Dressler (1982) and currently employed (e.g., Moure et al., 2007; Nemésio and Rasmus-

sen, 2011). Both analyses are also largely congruent in the recovery of several of Dressler's species groups as monophyletic, most notably his "*gorgonensis*" group, which is basal to the *Glossurella* grade and herein recognized as a separate subgenus. Although not as immediately distinctive as some other established subgenera or species groups in *Euglossa s. l.*, the combination of characters present in *Alloglossura* is unique and it is a stable clade (Hinojosa-Díaz, 2010). Most notably, the deeply invaginated poste-

rior section of the eight metasomal sternum of the male, with strongly projected lobes (Fig. 18), is different from all other species formerly included in the paraphyletic *Glossurella* (except those allied to *Glossura*), in which, the posterior section is projected as a triangle with no invaginated edges (i.e., Hinojosa-Díaz and Engel, 2011b: fig. 12). An exception to this could be *E. (G.) stilbonota* Dressler, a species originally included in the “*gorgonensis*” group, which has an intermediate shape of the posterior section of the eighth metasomal sternum. In some other features *E. (G.) stilbonota* resembles species of *Alloglossura*, specifically, punctation, structure of the posterior mesotibial tuft of the males, the convexity at the male metafemoral base, and shape of the female metabasitarsus. However, several other features, like the shape of the male metatibia, shape of the pronotal dorsolateral angle, and structure of the gonostylus, are closer to other species in the *Glossurella* grade. The affinity of *E. (G.) stilbonota* to species of *Alloglossura* is attested by its placement at the base of a clade including *E. (A.) fuscifrons*, *E. (A.) samperi*, *E. (A.) oleolucens*, and *E. (A.) paisa* in the molecular analyses (Ramírez et al., 2010). The morphology-based phylogeny for *Euglossa s. l.* (Hinojosa-Díaz, 2010) on the other hand separated *E. (G.) stilbonota* from a monophyletic assemblage formed by *E. (A.) oleolucens*, *E. (A.) trinotata*, *E. (A.) gorgonensis*, and *E. (A.) nigrosignata*. In the phylogenetic analysis performed in this study for the totality of species currently assigned to the new subgenus (Fig. 96), among the five species chosen as outgroups, *E. (G.) stilbonota* is not surprisingly recovered as sister to *Alloglossura* as here conceived. Certainly none of these analyses, including the restricted one herein, may be considered final and it is possible that *E. (G.) stilbonota* should be included in *Allo-*

glossura. For the moment we prefer not to include it based on its morphology that is closer to other members of the *Glossurella* grade and as reflected in the hypothesis of relationships in the broader morphology-based analysis for *Euglossa s. l.* (Hinojosa-Díaz, 2010). Another species originally included by Dressler in the “*gorgonensis*” group is *E. hyacinthina* Dressler, which both in the morphology based generic phylogeny (Hinojosa-Díaz, 2010) and in our restricted analysis, is placed apart from the *Alloglossura* clade. This species was not treated in the molecular analysis for the genus, but the morphological results indicate it as distinctly outside of *Alloglossura*. Although *E. hyacinthina* has a few superficial similarities with *Alloglossura*, the eight metasomal sternum of the male is of a distinctly different structure, as are numerous other morphological features (Hinojosa-Díaz, 2010). Although the molecular phylogenetic hypothesis placed *E. (A.) gorgonensis* away from a clade comprising *E. (A.) fuscifrons*, *E. (A.) trinotata*, *E. (A.) oleolucens*, and *E. (A.) paisa* (vide Ramírez et al., 2010), we have no hesitation to consider *E. (A.) gorgonensis* as part of *Alloglossura* given that it is morphologically very similar in nearly all respects to *E. (A.) fuscifrons*. Our phylogenetic hypothesis for interrelationships within the subgenus (Fig. 96) shows that the loss of the posterior lobe of the horseshoe-shaped posterior metatibial tuft (character 12) appeared once, together with the loss of integumental modifications of the second metasomal sternum (character 16) and the uniformity of the inner surface of the metatibia (character 15). Accordingly, *E. (A.) fuscifrons*, *E. (A.) gorgonensis*, and *E. (A.) nigrosignata* form a derived, monophyletic cluster in the group (Fig. 96).

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