



A new species of *Lucilia* Robineau-Desvoidy (Diptera, Calliphoridae) from the Amazon region and its potential distribution areas

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Abstract

Lucilia amazonia, sp. nov. from the Amazon region of Colombia and Brazil is described based on morphology. This species appears to be limited to the Amazon region and is quite distinctive and unlike other *Lucilia* in the region. A key to the species is provided following the *Lucilia* key in Whitworth (2014). Based on the distribution observed, its likely distribution is predicted.

Key words: Neotropical; morphology; taxonomy, key, MaxEnt

Introduction

Whitworth revised Neotropical *Lucilia* Robineau-Desvoidy found in the West Indies in 2010 and all of the neotropics in 2014. In the former publication, one new species of *Lucilia* was described and, in the latter, six new species were described. In 2015 each of the authors encountered lone male specimens that appeared to belong to an undescribed species of *Lucilia*. At the time, the female was unknown and we hoped to try to find more specimens before describing a new species. During a recent visit to the Bishop Museum by the senior author, two male specimens and a female of this species were found and we now describe it as *Lucilia amazonia* sp nov.

Material and methods

Terminology. The terminology used in this paper follows McAlpine (1981) and Rognes (1991), with exceptions discussed in Whitworth (2006). For the head character “frons width”, the expression “frons 0.10 (0.09–0.11/5) of head width at narrowest” means that the frons averages one tenth of the head width measured at the point of narrowest frons width in five specimens ranging from 0.09–0.11/5. See Whitworth (2006: figs 23–24) for how to measure frons width.

Abbreviations. Abdominal tergites and sternites are abbreviated as T and ST. T1+2 (syntergite 1+2) is the first apparent abdominal tergite, followed by T3–5. Dissected specimens are marked with an asterisk, sex is indicated by m for male, f for female.

The abbreviations for collections are as follows: BPBM-Bernice P. Bishop Museum, Honolulu, Hawaii, USA; FSCA-Florida State Collection of Arthropods, Gainesville, Florida, USA.

Dissections and photographs. See details of how dissections and photographs were done in Whitworth & Yusseff-Vanegas (2019).

Spatial mapping. Spatial modeling based on locations of occurrence reported on original labels, including climatic variables obtained from Worldclim (Fick & Hijmans, 2017) was followed to predict this species likely distribution (Fig. 16). The potential distribution model was generated using the maximum entropy algorithm

incorporated in MaxEnt v.3.3.3k (Phillips *et al.*, 2006) and projected to the Amazon region, mapped and edited in ArcGIS Pro (ESRI, 2011).

Identifications. The *Lucilia* keys in Whitworth (2014) were relied on to determine the placement of this new species.

Taxonomy

Family Calliphoridae

Lucilia amazonia Whitworth & Amat, sp. nov.

Diagnosis. A small fly, 7–9 mm in length, both sexes of this species have a brilliant green thorax and abdomen, with tomentum weak or absent (Figs 1, 2.). The posterior two-thirds or more of gena and all of postgena with pale setae, with dark setae anterior edge of gena (Fig. 3). Males of *L. amazonia* with exceptionally broad frons, averaging 0.127 (0.12–0.13/3) of head width at narrowest (Fig. 4), much broader than frons width of similar species in the neotropics. Sternite 5 is broad, almost twice the width of ST4 (Fig. 14). This species keys to *L. albofusca* Whitworth in couplet 10 in Whitworth's (2014) *Lucilia* key based on the pale setae on gena, a dark basicosta and pale upper calypters in both sexes. The pale upper calypter appears to be normal, but specimens exposed to high heat and humidity may have some darkening of the rim and disc of upper calypter (especially a problem in the tropics). Thus, they would go to couplet 11 and be miskeyed if that option is chosen. Males of this species can be distinguished from *L. albofusca* based on the very narrow frons width in the former (0.02, 0.01–0.02/5) versus much broader in the latter 0.127 (0.12–0.13/3). Male terminalia and other characters of this species are much different than those in *L. albofusca*: The former has surstylus digitate and rounded distally (fig. 39 Whitworth 2014), the latter with surstylus hooking posteriorly and ending in a sharp point (Fig. 7); phallus slender (fig. 63 Whitworth 2014) versus phallus with short, stout epiphallus and short, broad acrophallus (Fig. 9); Hypandrium slender (fig. 87 Whitworth 2014) versus broad (Fig. 11); ejaculatory sclerite slender (fig. 123 Whitworth 2014) versus broad (Fig. 13); ST2–4 narrow versus (fig. 123) versus broad (Fig. 14). The female of *L. albofusca* has a narrower frons 0.21 (0.20–0.22/5) than *L. amazonia* with a frons width of 0.24/1.

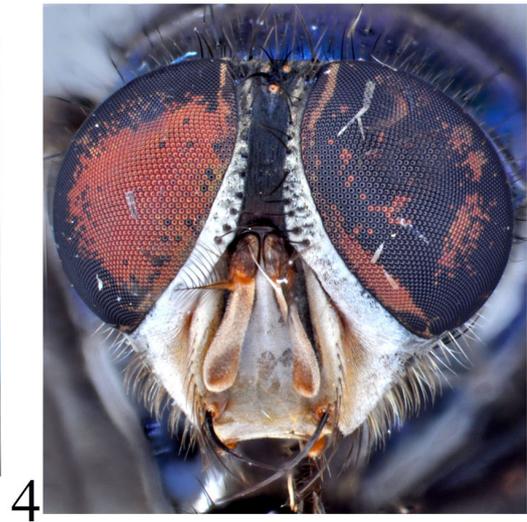
Description. *Male.* Head. Frons broad, 0.127 (12–13/3) of head width at narrowest, almost twice the width of the first flagellomere (Fig. 4); anterior eye facets larger, about twice posterior facets (Fig. 4); fronto-orbital plate and parafacial with silvery vestiture, except lower, inner parafacial vestiture is orange (Fig. 4), lower 2/3 gena vestiture is dark silvery; frontal vitta black above, to reddish below; gena and post gena with pale setae, about 1/3 of anterior edge of the gena with dark setae (Fig. 3); occiput with only pale weak setae below stout, dark postocular row (Tantawi & Sinclair, 2013, Whitworth, 2014).

Thorax. Brilliant green, with tomentum weak or absent; upper calypter pale, sometimes slightly darkened in discolored specimens, lower calypter brown; tegula and basicosta dark brown; proepisternal depression with pale setae; anterior and posterior spiracles brown, medium sized; acrostichals 2:2.

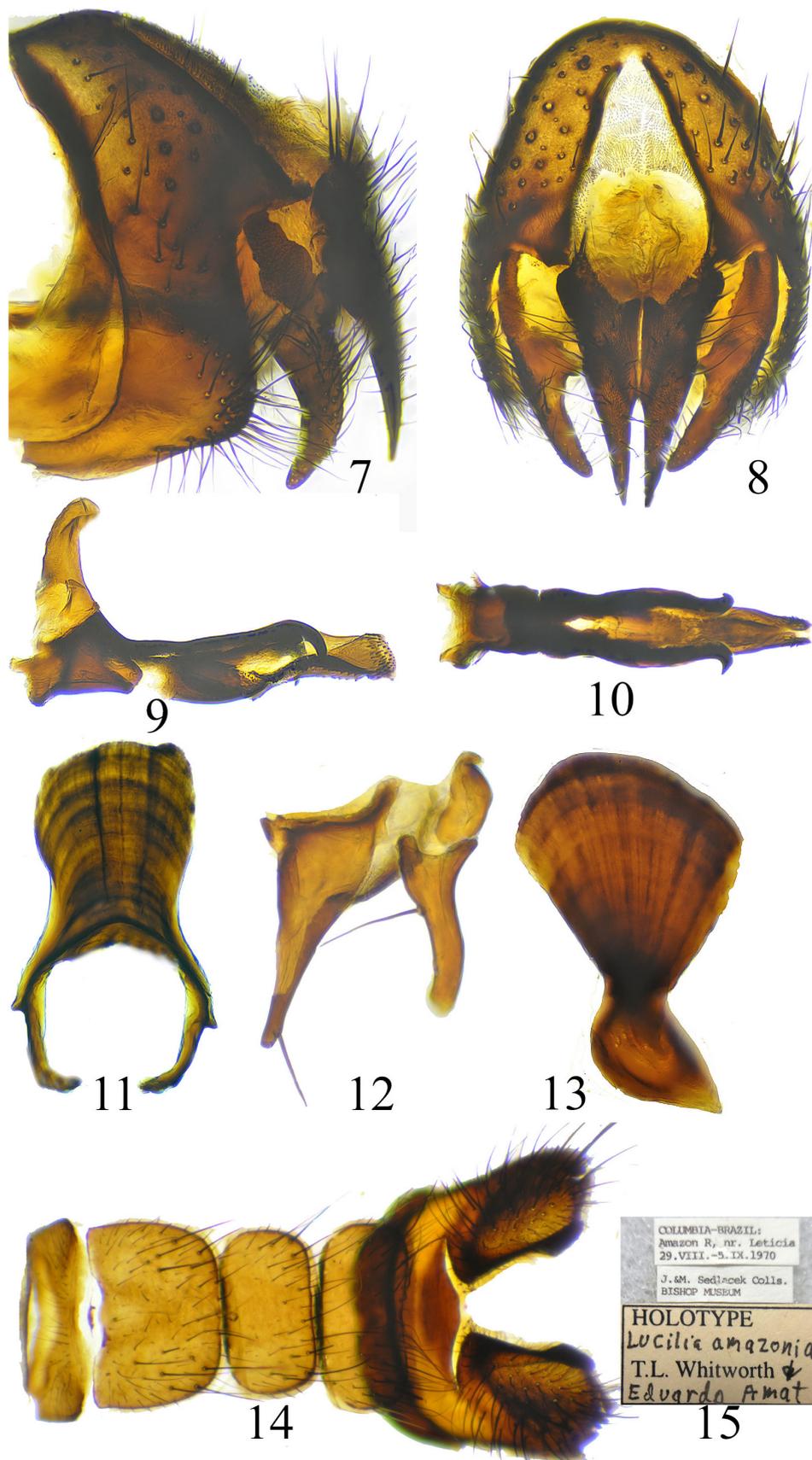
Abdomen. Brilliant green without tomentum or, at most very weak tomentum (Figs 1, 2); terminalia distinctive, cerci, surstyli and epandrium as in Figs 7, 8; phallus short and stout with a short epiphallus and acrophallus, acrophallus heavily spined on tip (Figs 9, 10) and hypandrium broad (Fig. 11); pre- and postgonite as in Fig. 12; ejaculatory sclerite large (Fig 13); ST1–5 with ST5 large, about twice the width of ST4 (Fig. 14).

Female. Similar to male, except frons 0.24 of head width at narrowest (only one female was available to measure).

Type material. HOLOTYPE male* (Figs. 5, 15), 1 PARATYPE male* and 1 ALLOTYPE female (Fig. 6) all from Colombia (misspelled Columbia on label) near Leticia, along the Amazon River, 29.viii.–5.ix.1970, J. & M. Sedlacek. Types have been returned to BPBM. 1 PARATYPE male* collected from Brazil, Altamira, xi. 1974, no. 112, John Reinert. Paratype has been returned to FSCA. A third PARATYPE male was dissected and illustrated, but has since been lost. It was collected from Colombia, Vaupés, Taraira, Estación Biológica Mosiro-Itajura Caparú, 1°4'31.60"S 69°30'49.5"W, 01.ii.2003, Michael Sharkey & Diana Arias Leg, Malaise Trap. Collection locations and predictions of likely species distribution are shown in Fig. 16.



FIGURES 1–6. *L. amazonia* sp. nov., paratype male, shining cuticle: 1. Dorsum. 2. Left lateral view. 3. Setal color pattern on postgena and gena, pale posteriorly, dark on anterior half of gena. 4. Anterior view of head. 5. Left lateral view of holotype male. 6. Left lateral view of allotype female.



FIGURES 7–14. Male *L. amazonia* sp. nov. terminalia: 7. Epandrium, surstyli and cerci. Left lateral view. 8. Posterior view. 9. Phallus. Left lateral view. 10. Dorsal view. 11. Dorsal view of hypandrium. 12. Pre- and postgonite. 13. ejaculatory sclerite. 14. ST 1–5. 15. Holotype labels, note collector misspelled country name.

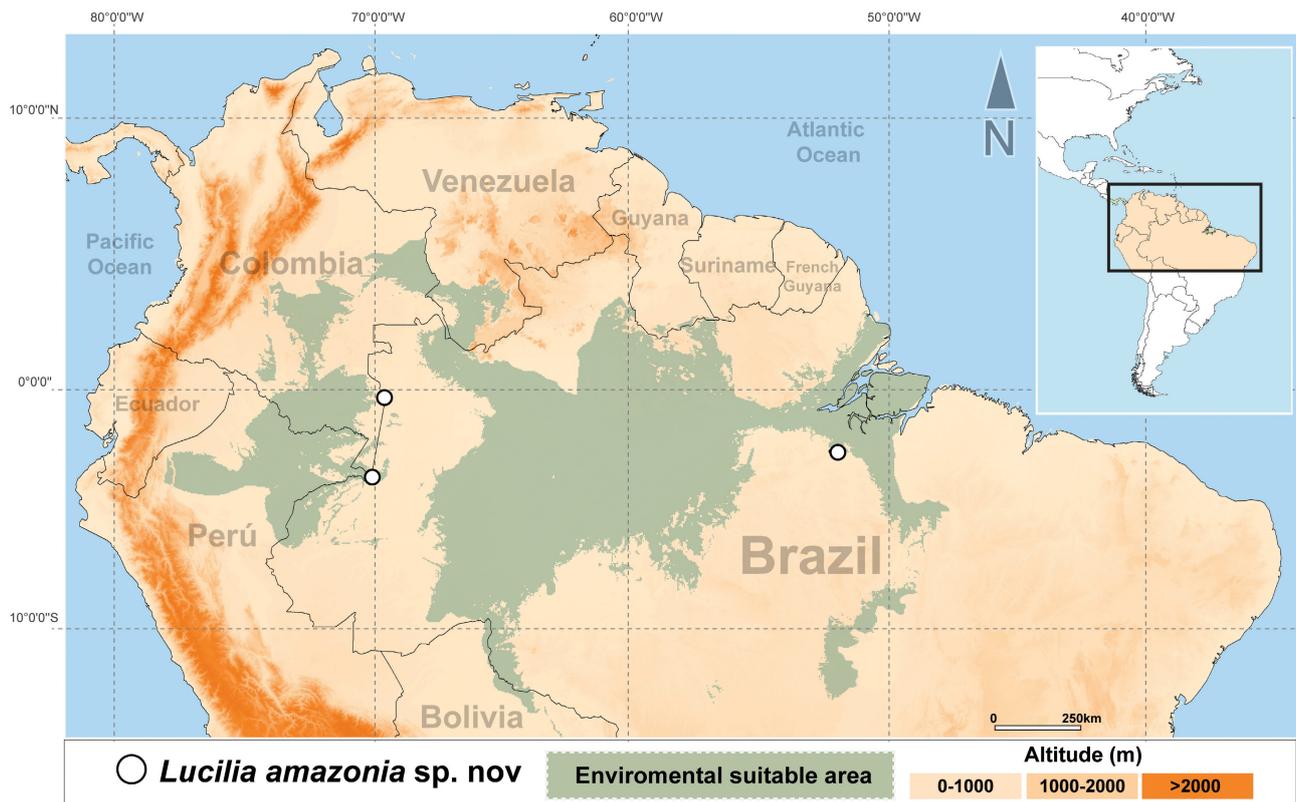


FIGURE 16. Map of geographical records and environmentally suitable areas for *L. amazonia*, **sp. nov.** in the Amazon region, South America.

Discussion. *Lucilia cuprina* and *L. sericata* males also have broad frons, but these species have 3 postsutural acrostichal setae, while *L. amazonia* has only 2. The male of one other species in the neotropics with 2 acrostichal setae, *L. cluvia* has a broad frons, but it is not found south of Central America and is readily separated in the Whitworth (2014) key. Finally, three species in the Galapagos also have males with broad frons, but they are not known from the mainland of South America. Furthermore, a comparison of terminalia characters show they are distinctly different from *L. amazonia* (Tantawi & Sinclair, 2013). Identification of this species is complicated by the fact that the male specimens appear teneral, discolored and distorted due, in part, to the hot humid climate where they were collected. Whitworth (2010) noted this problem was observed in many specimens of *L. fayeae* found which favor hot, humid environments near water in the West Indies. To avoid this problem, ideally specimens should be killed quickly and moved to a cooler, less humid environment and allowed to dry out quickly. Known only from the Amazon Region in Colombia and Brazil. Apparently, a large portion of the Amazonian region is environmentally suitable for supporting populations of this species (Figure 16).

Key for how to identify *Lucilia amazonia*, sp. nov.

Refer to the *Lucilia* key in Whitworth (2014), couplets 1–10. The figure numbers for *L. albofusca* relate to figures shown in Whitworth (2014).

- 11. Pale setae on posterior one-quarter of gena; male frons very narrow, 0.02 (0.01–0.02/5) of head width at narrowest, about equal to width of anterior ocellus; surstylus digitate, parallel sided, distally broad (fig. 39, Whitworth 2014); female frons narrow, 0.21 (0.20–0.22/5) of head width at narrowest. Known from Brazil, Colombia, Ecuador, French Guiana, Guyana (British Guyana), Panama, Peru, and Venezuela (figs. 159, 160). *L. albofusca* Whitworth
- Pale setae on posterior half or more of gena; male frons very broad, 0.127 (0.12–0.13/3) of head width at narrowest, about twice the width of first flagellomere; surstylus curved to rear ending in sharp point (Fig. 7); female frons 0.24/1 of head width at narrowest; known only from the Amazon Region in Colombia and Brazil. *L. amazonia*, sp. nov.

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