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Adelomyrmex dorae sp. nov. Garcia-Martinez (Hymenoptera: Formicidae): a new species supported by parsimony analysis of morphological characters

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ABSTRACT

The genus *Adelomyrmex* is a group of myrmecine ants, occurring primarily in rotten wood and leaf litter of tropical rain and cloud forests. In this paper, we describe *Adelomyrmex dorae* sp. nov. Garcia-Martinez 2017 based on several morphological characters assessed by a parsimony analysis. Based on morphology, *A. dorae* may be recognized by the smooth and shiny spots on the genae and the slightly sinuous but somewhat longitudinally oriented rugae on the lateral and dorsal faces of the pronotum. We sampled several habitats in central Veracruz, including tropical montane cloud forest fragments, coffee plantations, cattle pastures and human settlements. This species seems restricted to remnants of riparian vegetation. Although Mexico has a relatively well-known myrmecofauna, the sampling of ecologically important ecosystems, such as riparian remnants, could result in the discovery of new species.

Keywords: Myrmicinae, leaf-litter, riparian vegetation, cloud forest, Mexico

INTRODUCTION

The genus *Adelomyrmex* is a group of myrmicine ants with a clypeus divided into posterior and anterior portions by a transverse carina. The anterior portion is folded under at an acute angle, forming a ventral face. The carina forms a pronounced, narrow median projection, typically bilobed or bidentate, that descends toward the lateral margins of the clypeus (Longino 2012). One autapomorphy for this genus is the row of lamelliform setae parallel to the masticatory margin on the inner surface of the mandible (Fernández 2003).

This ant genus is very abundant and diverse in rotten wood and leaf litter in the tropical montane cloud forests of Central America (Longino 2012). The current geographic range of the genus in the mainland Americas is from northern Mexico to Amazonian Brazil, including the islands of Galápagos and Cocos (Fernández 2004, Longino 2012). The known *Adelomyrmex* species in Mexico are *A. betoi* Fernández, *A. dentivagans* Longino, *A. foveolatus* Fernández, *A. longinoi* Fernández, *A. mackayi* Fernández, *A. marginodus* Longino, *A. metzabok* Longino, *A. micans* Fernández, *A. myops* (Wheeler), *A. nortenyo* Longino, *A. paratristani* Longino, *A. robustus* Fernández, *A. silvestrii* (Menozzi) and *A. tristani* (Menozzi) (Longino 2012, Vásquez-Bolaños 2015).

Several studies have clarified the descriptions, distributions and taxonomy of known species of *Adelomyrmex*. A species-level revision of the *A. laevigatus* species complex was carried out by Fernández and MacKay (2003). A revision of all known species of the *Adelomyrmex* genus-group in addition to a redescription of the genus and the description of some new species was made by Fernández (2003). Fernández (2004) provided a diagnosis of *Adelomyrmex*, the systematic placement of this genus in the Adelomyrmecini tribe and the

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segregation of two known species in the closely allied genus *Cryptomyrmex*. Subsequently, Longino (2012) reviewed the taxonomy and natural history of this genus and described nine new species (eight from Mexico and Central America and one from Cocos Island). Overall, this revision treated the 21 Mexican and Central American species in some detail and provided the most current key for the 26 species of the mainland Americas. Finally, in a phylogenetic and biogeographical study of myrmicine ants, the *Adelomyrmex* genus was transferred to the Solenopsidini tribe based on molecular analysis (Ward et al. 2015).

Recently, a preliminary DNA-based analysis suggested that some geographically separated *Adelomyrmex* populations considered to be a single species may indeed be different species. These findings suggest that this genus represents a lineage with extremely low dispersibility and gene flow, perhaps contributing to the high levels of endemism and geographic variation (Longino 2012). Due to the lack of phylogenetic analyses of *Adelomyrmex,* some described species could form species complexes, and many of them have not yet been described. In this paper, we delimit a new species of the genus *Adelomyrmex* based on several morphological characters assessed by a parsimony analysis. The underlying philosophy driving the separation of species in this study is that of the phylogenetic species concept. Under this perspective, a species consists of an ancestor, and all descendants are commonly inferred from their possession of shared derived characters (De Queiroz 2007).

MATERIAL AND METHODS

Taxon sampling — The examined material of *Adelomyrmex* was collected in riparian vegetation remnants of tropical montane cloud forest in central Veracruz, Mexico, from years 2000 to 2015. A total of 45 individuals from nine populations with 1 to 17 individuals per population was analyzed. The examined material was collected using pitfall traps and from leaf-litter using Berlese-Tullgren funnels and Winkler sacks. The key of Longino (2012) was used to identify ant species *a priori*. The specimens that could not be identified with the key were designated as valid morphospecies for comparison among the entire sampling. For comparing the unidentified morphospecies, we used morphologically similar taxa from the key of Longino (2012) (i.e., *A. cristiani* Fernández, *A. dentivagans*, *A. nortenyo* and *A. quetzal* Longino). The species *A. cristiani* was used as the outgroup.

Morphological data set. —The morphological matrix included 31 characters, of which 15 were qualitative (Table 1 & 2) and 16 quantitative (Table 2). Character selection was based on the list of characters and illustrations by Longino (2012). Characters were scored by examining mounted material with a Nikon SMZ1500 stereomicroscope. Standard measurements (in mm) were taken at 8–11.25x with the same stereomicroscope and were measured using the measuring tool in the NIS-Elements software. Measurements are given to the second decimal place, and ranges express minimum – maximum values. The morphological terminology for the measurements and the indices employed throughout this article are defined as follows (Table 2):

EL: eye length; maximum length of compound eye.

FSH: facial seta height; measured in profile from surface of approximate midpoint of face to general top of setal layer, e.g., not to maximum height of longest projecting seta.

GSH: gastral seta height; measured in profile from surface of approximate midpoint of gaster to general top of setal layer.

HL: head length; the length of the head proper, excluding the mandibles; measured in full-face view from the midpoint of the anterior clypeal margin to a line drawn across the posterior margin from its highest point.

HW: head width; the maximum width of the head in full-face view including eyes if eyes protrude beyond margins of head.

MSH: mesosomal seta height; measured in profile from surface of approximate midpoint of mesosoma to general top of setal layer.

MW: mesosoma width; maximum width of mesosoma in dorsal view.

PH: petiole height; maximum height of petiole in profile view.

PL: petiole length; maximum length of petiole in profile view.

PPH: postpetiole height; maximum height of postpetiole in profile view.
PPL: postpetiole length; maximum length of postpetiole in profile view.
PPW: postpetiole width; maximum width of postpetiole in dorsal view.
PSL: propodeal spine length; distance from inflection point between dorsal face of propodeum and base of spine to tip of spine.
PW: petiole width; maximum width of petiole in dorsal view.
SL: scape length; the maximum length of the antennal scape excluding the condylar bulb and neck.
WL: Weber's length; in lateral view, the distance from the posterior most border of the metapleural lobe to the anterior most border of the pronotum, excluding the neck.

Phylogenetic analysis — The 45 examined individuals of *Adelomyrmex* were grouped in populations according to the locality where they were collected. Each population was treated as a terminal unit. Parsimony analysis was run in TNT (Goloboff and Catalano 2016) using a traditional search approach with the swapping algorithm of tree bisection reconnection (TBR) and 1,000,000 replicates. Parsimony bootstrapping support for internal branches was estimated with 1,000,000 replicates using TBR branch swapping with 10 random entry orders, saving one tree per replicate.

Data management — Collection and specimen data for all examined material in this study, along with all color images, have been uploaded to AntWeb (http://www.antweb.org), a site hosted by the California Academy of Sciences. AntWeb subsequently provides all specimen level data, images and natural history content to the Global Biodiversity Information Facility (http://www.GBIF.org), the Encyclopedia of Life (http://www.EOL.org) and Wikipedia (http://www.wikipedia.org).

Species name — The new species name in this paper should be treated as nouns in apposition and thus invariant. This holds true even if the derivation of a name suggests otherwise.

Specimen repositories — Collections are referred to by the following acronyms, which follow the Insect and Spider Collections of the World website (Evenhuis 2012):

CAS California Academy of Sciences, San Francisco, CA, USA.
COLPOS El Colegio de Posgraduados.
ECOSUR El Colegio de la Frontera Sur, Chetumal, Quintana Roo, México.
FACBAC Colección de Arthropoda, Universidad Veracruzana, Facultad de Ciencias Biológicas y Agropecuarias Región Córdoba-Orizaba *campus* Peñuela, Amatlán de los Reyes Veracruz, México.
JTLC John T. Longino, personal collection, University of Utah, Salt Lake City, UT, USA.
KYFMC Karla Y. Flores-Maldonado, personal collection, Universidad Autonoma de Tamaulipas, Ciudad Victoria, Tamaulipas, México.
MAGMC Colección de Formicidae Miguel A. García-Martínez, personal collection, Universidad Veracruzana, Facultad de Ciencias Biológicas y Agropecuarias Región Córdoba-Orizaba, Veracruz, México.
UdeG Universidad de Guadalajara, Zapopan, Jalisco, México.
UNAM Universidad Nacional Autónoma de México, México D. F., México.
USNM National Museum of Natural History, Washington, DC, USA.

RESULTS

We scored a total of 34 characters, of which 27 were parsimony informative (Table 2). Parsimony analysis of the complete dataset resulted in a single most parsimonious tree (Fig. 1; length = 30, consistency index = 0.87, retention index = 0.67). This tree displays four well-supported clades (all with a bootstrap > 89%) formed by individuals of *A. dentivagans, A. quetzal, A. cristiani* and *A. nortenyo*, and the remaining were composed of nine populations of *A*. sp. nov. Only the internal clades formed by the nine populations of *A.* sp. nov. were not well supported (all with a bootstrap < 50%).

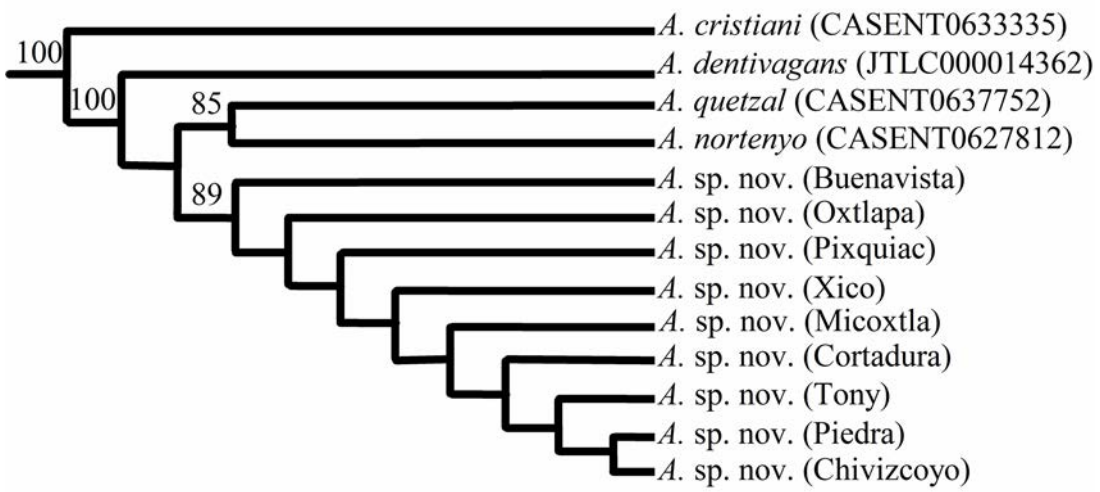

Figure 1: The single most parsimonious tree retrieved from the morphological data set (length = 30, consistency index = 0.87, retention index = 0.67). The species determined *a priori* are indicated in italics, and the codes between brackets indicate the AntWeb identifiers. The numbers above the branches show the confidence probability of the Bootstrap support test.

SYSTEMATIC TREATMENT

***Adelomyrmex dorae*, sp. nov. Garcia-Martinez**
Figures 2–7, Tables 1 & 2
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Holotype worker — MEXICO: Veracruz, San Andrés Tlalnelhuayocan, Chivizcoyo; 19.515693, -97.005495, 1,624 m; 1 Nov 2015, riparian cloud forest, leaf-litter, Winkler (1 worker), G. Pérez & M. García *leg.*, IEXA ANTWEB 1008907.

Paratype workers — MEXICO: Veracruz, Coatepec, La Cortadura, 19.495142, -97.036217, 2,032 m, 21 Jul 2011, riparian cloud forest, leaf-litter, Winkler (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008907; (1 worker) same data as previous, except IEXA ANTWEB 1008908; (1 worker) same data as previous, except 2 May 2012, IEXA ANTWEB 1008909; Ixhuacán de Los Reyes, Puente Buenavista, 19.403812, -97.086806, 1,764 m, 2 May 2012, riparian cloud forest, leaf-litter, Berlese (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008910; (1 worker) same data as previous, except Winkler, IEXA ANTWEB 1008911; San Andrés Tlalnelhuayocan, Piedra Parada, 19.516597, -97.010241, 1,651 m, 15 Jul 2011, riparian cloud forest, leaf-litter, Berlese (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008912; (1 worker) same data as previous, except 2 May 2012, IEXA ANTWEB 1008913; San Andrés Tlalnelhuayocan, Pixquiac, 19.534610, -96.997899, 1,546 m, 13 Jul 2011, riparian cloud forest, leaf-litter, Winkler (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008914; (1 worker) same data as previous, except 2 May 2012, IEXA ANTWEB 1008915; San Andrés Tlalnelhuayocan, Tony, 19.515627, -97.003356, 1,601 m, 15 Jul 2011, riparian cloud forest, leaf-litter, Berlese (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008916; (1 worker) same data as previous, except Winkler, IEXA ANTWEB 1008917; Xico, Micoxtla, 19.456083, -97.030683, 1,730 m, 14 Jul 2011, riparian cloud forest, leaf-litter, Berlese (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008918; (1worker) same data as previous, except 2 May 2012, Winkler, IEXA ANTWEB 1008919; Xico, Xico Viejo, 19.451513, -97.058816, 1,759 m, 2 May 2012, riparian cloud forest, leaf-litter, Berlese (1 worker), F. Escobar & F. Alvarado *leg.*, IEXA ANTWEB 1008920; (1 worker) same data as previous, except 19 Jul 2011, Winkler, IEXA

ANTWEB 1008921; Xico, Oxtlapa, 19.414687, -97.056158, 1,699 m, 15 Nov 2000, riparian cloud forest, soil, pitfall (1 worker), E. Montes de Oca *leg.*, IEXA ANTWEB 1008922; Coatepec, 19.513810, -97.020980, 1,970 m; 05 Mar 2015, riparian cloud forest, leaf-litter, maxiWinkler (1 worker), M. G. Branstetter *leg*., JTLC CASENT0640883; (1 worker) same data as holotype worker, except CAS ANTWEB 1008924; (1 worker) same data as holotype worker, except UDEG ANTWEB 1008925; (1 worker) same data as holotype worker, except UNAM ANTWEB 1008926; (1 worker) same data as holotype worker, except COLPOS ANTWEB 1008927; (1 worker) same data as holotype worker, except ECOSUR ANTWEB 1008928; (1 worker) same data as holotype worker, except MAGMC ANTWEB 1008929; (1 worker) same data as holotype worker, except FACBAC ANTWEB 1008930; (1 worker) same data as holotype worker, except USNM ANTWEB 1008931; (1 worker) same data as holotype worker, except KYFMC ANTWEB 1008932.

Diagnosis — *Adelomyrmex dorae* may be recognized by the smooth and shiny spots on its genae, the completely black mesosoma, the slightly sinuous but somewhat longitudinally oriented rugae of the lateral and the dorsal faces of the pronotum and the smooth and shiny sculpture of the anterior margin of the postpetiole.

Description — *Worker.* Head (Fig. 2): mandible without differentiated masticatory and basal margins. Six distinct teeth distributed from apex to base; fifth tooth closer to sixth (basal) tooth than to fourth tooth. Deep notch located between sixth tooth and basal condyle. Dorsal surface of mandible has several coarse longitudinal striae and some large piligerous puncta. In full face view, lateral clypeal teeth project from beneath clypeal shelf; located on anterior (ventral) margin of clypeus, separate from the transverse carina that forms the clypeal shelf. Eye composed of 9–12 ommatidia. Face fully sculptured with longitudinal rugae. Scape has abundant and long subdecumbent pubescence. Clypeus and frontal carinae have few long, erect setae. Posterior and posterolateral margins of head have subdecumbent setae. Anterior and mid-section of tibia have sparse and subdecumbent setae; hind section has abundant subdecumbent setae. In profile view, dorsal surface of head has long, abundant and erect setae. Mesosoma (Figs. 3 & 4): Short anterior face of pronotum separated from dorsal face by an elevated transverse ruga. In profile view, dorsal surface of promesonotum and propodeum appears as an arched convexity with an impressed metanotal groove. Propodeal spines are pronounced and acute. Space between propodeal spines forms broad concavity without distinct dorsal and posterior faces; smooth and shiny with few transverse rugae. Rest of mesosoma has marked linear and longitudinal rugae. Petiolar and postpetiolar nodes quadrate with differentiated anterior, dorsal and posterior faces. Lateral sides of petiole and postpetiole have coarse, irregular rugae; dorsal surface transversely rugose. In dorsal view, postpetiole is slightly longer than wide, and both anterior and posterior margins are rounded. In profile, dorsal surfaces of promesonotum relatively long, sparse and erect setae. Gaster (Figs. 3 & 4): Gaster completely black, smooth and shiny. In profile view, dorsal surfaces of gaster relatively long, sparse and sub-erect setae.

Measurements — (n = 45; *in millimeters*) EL = 0.07 (0.05–0.12), FSH = 0.09 (0.08–0.10), GSH = 0.13 (0.11–0.13), HL = 0.67 (0.61–0.82), HW = 0.63 (0.56–0.82), MSH = 0.10 (0.9–0.11), MW = 0.41 (0.39–0.53), PH = 0.25 (0.23–0.32), PL = 0.29 (0.11–0.39), PPH = 0.21 (0.19–0.26), PPL = 0.10 (0.07–0.28), PPW = 0.20 (0.18–0.26), PSL = 0.06 (0.02–0.61), PW = 0.19 (0.16–0.25), SL = 0.44 (0.39–0.53), WL = 0.69 (0.62–0.82).

Queen — MEXICO: Veracruz, San Andrés Tlalnelhuayocan, Chivizcoyo; 19.515693, -97.005495, 1,624 m; 1 Nov 2015, riparian cloud forest, leaf-litter, Winkler (1 queen), G. Pérez & M. García *leg*., IEXA ANTWEB 1008923. Queens similar to workers except for queen-specific characters like large compound eyes (with 28–46 ommatidia), three ocelli and enlarged mesosoma with queen-typical sclerites. Pronotum medially smooth with a few laterally and longitudinally oriented rugae. Dorsal promesonotum has a large, semicircular, smooth, shiny spot. Scutellum smooth and shiny with a few lateral and longitudinal rugae. Katepisternum longitudinally and dorsally rugose with a smooth and shiny spot which has a lunula shape (like two intersecting circles). Anepisternum ventrally smooth and longitudinally rugose

dorsally. Side of propodeum longitudinally rugose. *Measurements* – EL = 0.14, FSH = 0.09, GSH = 0.20, HL = 0.70, HW = 0.71, MSH = 0.12, MW = 0.54, PH = 0.28, PL= 0.36, PPH = 0.24, PPL = 0.09, PPW = 0.26, PSL = 0.07, PW = 0.21, SL = 0.47, WL = 0.79.

Male — Unknown.

Etymology — The epithet of this species is dedicated to our colleague and friend Dora Luz Martínez Tlapa, who found the first individuals of these *Adelomyrmex* ants during sample processing. The name is treated as nouns in apposition.

DISCUSSION

In this paper, we describe the combination of characters (in the description and the diagnosis) that unmistakably separate *Adelomyrmex dorae* from other *Adelomyrmex* species. With the present newly discovered species, the number of known species of the *Adelomyrmex* genus for the state of Veracruz increases to seven, for Mexico to 15 and for Central America to 22 (Longino 2012, García-Martínez et al. 2015, Vásquez-Bolaños 2015). This finding suggests that systematic samplings should be performed to discover new species in Mexico, especially in cloud forest regions, which are one of the most threatened tropical ecosystems (Williams-Linera et al. 2002).

Regarding geographic distribution, *A. dorae* seems to only be distributed in the central region of the state of Veracruz, Mexico, at an elevational range of 1,600 to 2,000 m. The central mountainous region of Veracruz is located in the geographical range of tropical montane cloud forest (TMCF). This region once had a high percentage of TMCF land cover, but most of this area has currently been converted to other land uses such as secondary vegetation, coffee and pine plantations, bean and corn crops, pastures for animal husbandry and human settlements (García-Martínez et al. 2017).

We also observed that *A. dorae* species appear to restrict their distribution to remnants of riparian vegetation of tropical cloud forest. All the examined individuals were unique to this type of environment. Leaf-litter and pitfall samples from the most common habitats in the surrounding areas of the studied region (i.e., cloud forest, coffee plantations, human settlements, corn and sugar cane crops and pastures) failed to produce any specimens of *A. dorae*. According to the ecological data provided by García-Martínez et al. (2015), of a total of 78 occurrences of *A. dorae* were recorded, of which 51% were registered in the dry season and 49% in the rainy season. These authors indicated that upon comparing the number of individuals of *A. dorae* in each riparian remnant between sampling methods and seasons, significant differences were not observed (García-Martínez et al. 2015). Notably, this species inhabits disturbed riparian cloud forest with soil compaction greater than 8 kg/cm, a litter-layer depth varying from 0.2 to 2 cm, a tree canopy cover ranging from 20% to 60% and a tree canopy height of less than 16 m. Most of the riparian remnants where *A. dorae* was collected have a tree species richness of less than 10 species and a tree species abundance of less than 20 trees per hectare (García-Martínez et al. 2015).

Adelomyrmex dorae can be distinguished from all other *Adelomyrmex* species by the following combination of character states: 1) the smooth and shiny spots on its genae, 2) the completely black mesosoma, 3) the slightly sinuous but somewhat longitudinally oriented rugae of the lateral and the dorsal faces of the pronotum and 4) the smooth and shiny sculpture of the anterior margin of the postpetiole. Based on the morphological characters of *A. dorae*, we suggest that it belongs to a species group called "Central American species", which is composed of the species *A. dentivagans*, *A. mackayi*, *A. nortenyo* and *A. quetzal* (Longino 2012). This species group has some synapomorphies such as the lack of a posterior triangular projection on the postpetiole, which extends over the gaster and is closely appressed to it as in *A. silvestrii*. Species of this group also have a mandible without differentiated basal and masticatory margins. Finally, if we count from the basal tooth on the basal margin (near the mandibular insertion), the second tooth is closer to the basal tooth than to the third tooth (Longino 2012).

According to the morphological characters we observed, *A. dorae* and *A. quetzal* are similar in the color of their head and gaster (completely black), face and promesonotum sculpture (linearly rugose with longitudinal orientation) and postpetiole shape (quadrate). Both species also have similar HW, wherein the HW range of *A. quetzal* (0.67–0.71 mm) falls within that of *A. dorae* (0.56–0.82 mm).

However, *Adelomyrmex dorae* may be differentiated from *A. quetzal* by its well-impressed metanotal groove, black color of the mesosoma, rugose sculpture of the propodeum, suberect setae on the gaster, quadrate petiole and its promesonotum, which is slightly elevated above the dorsal face of the propodeum. Meanwhile, some morphological similarities also exist between *A. dorae* and *A. nortenyo* such as their impressed metanotal groove, linearly rugose sculpture of the face and propodeum, suberect setae on the gaster and their promesonotum, which is slightly elevated above the dorsal face of the propodeum. Size was not a useful character to separate these species because the HW of *A. nortenyo* ranges between 0.64–0.69 mm. *A. dorae* can be differentiated from *A. nortenyo* by the color of the head, mesosoma and gaster; the sculpture and orientation of the rugae on the promesonotum and the shape of the petiole and postpetiole. In addition, similarities between *A. dorae* and *A. dentivagans* are observed in the sculpture and orientation of the rugae on the promesonotum and the propodeum as well as the shape of the petiole, the postpetiole and the promesonotum, wherein the latter is elevated above the dorsal face of the propodeum. *Adelomyrmex dorae* differs from *A. dentivagans* in its metanotal groove, color of head, mesosoma and gaster, face sculpture and aspect of the setae on the gaster in profile view. Finally, the similar *A. cristiani* is easily differentiated from *A. dorae* by the light brown color of its head, mesosoma and gaster in addition to its paler legs and antennae. *Adelomyrmex cristiani* is a small-sized ant (HW between 0.44–0.55 mm); in fact, it is one of the smaller species of the genus (Fernández 2003).

To incorporate *A. dorae* in the key of Longino (2012), the dichotomy number 8 should be modified for asking if the specimen is: a) strongly bicolored (dark brown head and mesosoma, light yellow brown gaster) (*A. mackayi* Fernández would key), or b) concolorous (dark brown or black) (next dichotomy). After that, a new dichotomy should be added for asking if the specimen is: a) concolorous dark brown with the metanotal groove slightly impressed (*A. quetzal* would key), or b) concolorous black with the metanotal groove impressed and a smooth and shiny spot on each gena (*A. dorae* would key).

Regarding the distributional patterns of these Central American species, *A. cristiani* is only known in Colombia and Ecuador; *A. dentivagans* in Mexico (state of Chiapas), Guatemala and Honduras; *A. nortenyo* in Mexico (state of Tamaulipas) and *A. quetzal* in Guatemala (Longino 2012, Vásquez-Bolaños 2015). At present, the known distribution of *A. dorae* is the central mountainous region of the state of Veracruz, Mexico. These observations suggest that the Central American species group has an isolated distribution. With this data, we can infer that the model of speciation for these species is allopatric due to the large distances among them and the non-overlapping distributional ranges of each species. To test this hypothesis and to continue with the discovery of new *Adelomyrmex* species, systematic samplings are essential in the tropical rain and montane cloud forests of Mexico and Central America. Further studies could shed greater light onto the diversification and distribution patterns of the myrmecine ants of the genus *Adelomyrmex*.

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Table 1. Qualitative characters utilized in the parsimony phylogenetic analysis of the examined *Adelomyrmex* species. Character-states are indicated by numbers: 0, 1, 2 or 3.

Characters and character-states
1. Head color. 0) light brown, 1) red brown, 2) dark brown, 3) black.
2. Face sculpture. 0) rugose, 1) linearly rugose.
3. Mesosoma color. 0) light brown, 1) red brown, 2) dark brown, 3) black.
4. Metanotal groove. 0) not impressed, 1) slightly impressed, 2) impressed.
5. Promesonotum sculpture. 0) linear, 1) rugose, 2) linearly rugose.
6. Orientation of rugae on promesonotum. 0) no longitudinal, 1) longitudinal.
7. Propodeum sculpture. 0) smooth, 1) rugose.
8. Shape of lateral rugae on pronotum. 0) linear, 1) wavy, 2) sinuous, 3) reticulate
9. Promesonotum height with respect to propodeum. 0) not elevated, 1) slightly elevated.
10. Petiole shape. 0) rounded, 1) semiquadrate, 2) quadrate.
11. Postpetiole shape. 0) rounded, 1) semiquadrate, 2) quadrate.
12. Sculpture of anterior margin of postpetiole. 0) smooth and shining, 1) rugose
13. Sculpture of posterior margin of postpetiole. 0) smooth and shining, 1) rugose
14. Gaster color. 0) light brown, 1) red brown, 2) dark brown, 3) black.
15. Aspect of setae on gaster. 0) suberect, 1) erect.

Table 2. Morphological data matrix. The first taxon is the outgroup (*A. cristiani*). Character-states of qualitative characters are indicated by numbers (0, 1, 2 or 3), see Table 1 for a detail description of each character-state.

Characters \ Taxa	***A. cristiani***	***A. dentivagans***	***A. dorae***	***A. nortenyo***	***A. quetzal***
Qualitative characters					
Head color	0	1	3	2	3
Face sculpture	1	0	1	1	1
Mesosoma color	0	1	3	1	2
Metanotal groove	0	0	2	2	1
Promesonotum sculpture	0	2	2	1	2
Orientation of rugae on promesonotum	1	1	1	0	1
Propodeum sculpture	1	1	1	1	0
Shape of lateral rugae on pronotum	0	1	2	3	1
Promesonotum height	0	0	0	0	1
Petiole shape	0	2	2	1	1
Postpetiole shape	0	2	2	0	2
Sculpture of anterior margin of postpetiole	1	1	0	1	1
Sculpture of posterior margin of postpetiole	0	1	1	1	1
Gaster color	0	2	3	2	3
Aspect of setae on gaster	0	1	0	0	1
Quantitative characters (in mm)					
Eye length (EL)	0.04	0.09	0.07	0.07	0.08
Facial seta height (FSH)	0.04	0.11	0.09	0.05	0.08
Head length (HL)	0.58	0.65	0.65	0.65	0.63
Head width (HW)	0.52	0.63	0.60	0.61	0.58
Scape length (SL)	0.35	0.41	0.42	0.39	0.42
Mesosomal seta height (MSH)	0.08	0.17	0.10	0.09	0.10
Mesosoma width (MW)	0.37	0.44	0.39	0.42	0.43
Weber's length (WL)	0.61	0.73	0.65	0.70	0.73
Propodeal spine length (PSL)	0.06	0.09	0.07	0.09	0.06
Petiole height (PH)	0.21	0.27	0.25	0.24	0.25
Petiole length (PL)	0.26	0.29	0.28	0.29	0.34
Petiole width (PW)	0.14	0.21	0.19	0.21	0.21
Postpetiole height (PPH)	0.16	0.22	0.20	0.22	0.21
Postpetiole length (PPL)	0.07	0.10	0.09	0.10	0.09
Postpetiole width (PPW)	0.15	0.23	0.21	0.21	0.21
Gastral setae height (GSH)	0.09	0.14	0.13	0.11	0.18

Figure 2. Head in full frontal view of the worker of *Adelomyrmex dorae* sp. nov. Garcia-Martinez

Figure 3. Dorsal view of the worker of *Adelomyrmex dorae* sp. nov. Garcia-Martinez

Figure 4. Lateral profile view of the worker of *Adelomyrmex dorae* sp. nov. Garcia-Martinez

Figure 5. Head in full frontal view of the queen of *Adelomyrmex dorae* sp. nov. Garcia-Martinez

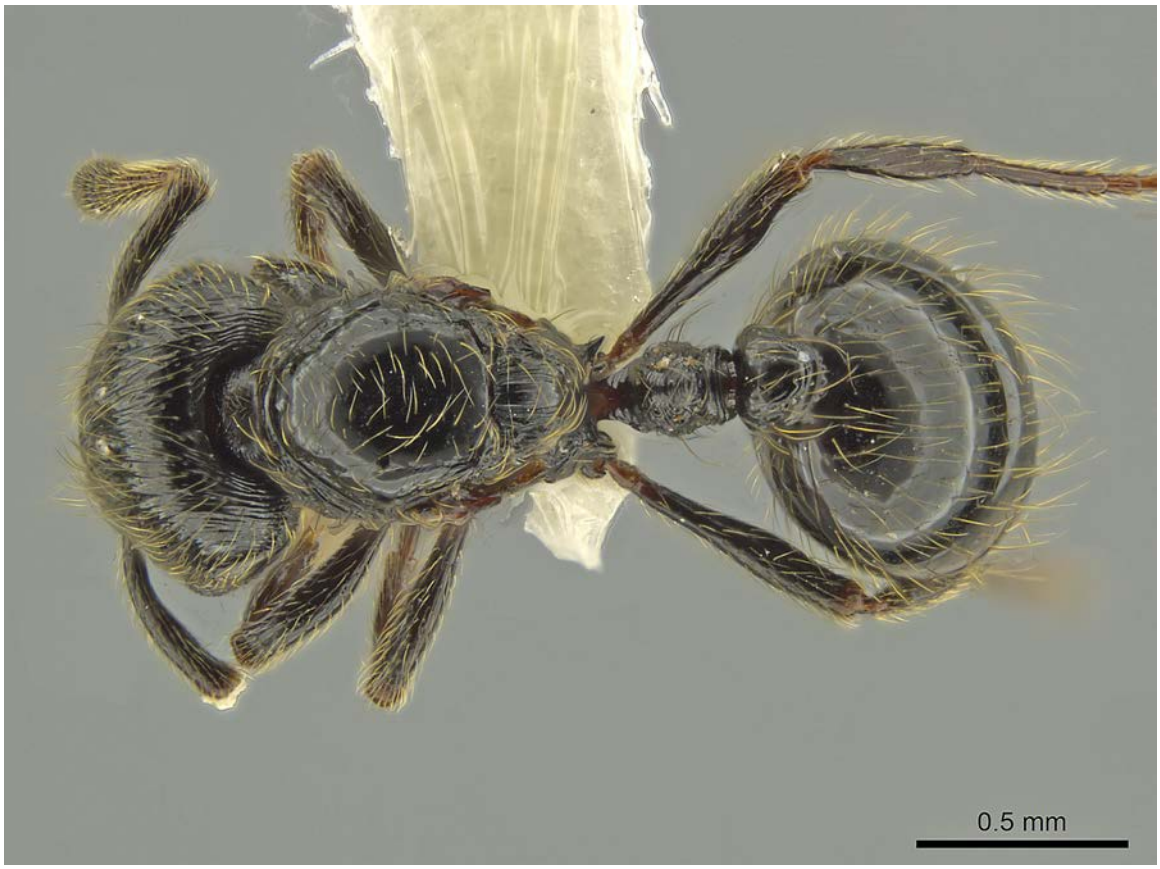

Figure 6. Dorsal view of the queen of *Adelomyrmex dorae* sp. nov. Garcia-Martinez

Figure 7. Lateral profile view of the queen of *Adelomyrmex dorae* sp. nov. Garcia-Martinez