Zootaxa 5782 (2): 313–329
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5782.2.4
http://zoobank.org/urn:lsid:zoobank.org:pub:69017FA0-B19A-4A1D-8BDB-CFAFC8B9D98A

New high elevation cockroach, *Lamproblatta neuque* sp. nov. (Dictyoptera: Lamproblattidae) from Colombia

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Abstract

We describe *Lamproblatta neuque* **sp. nov.**, a new cockroach species from high-elevation forest patches (~2600 m a.s.l.) near Bogotá, Colombia. This species is distinguished by a W-shaped ninth tergite, unique morphology of the subgenital and supra-anal plates, and the structure of the ootheca. Males also exhibit a small tergal gland on the supra-anal plate, expanding the known variation of this feature within Lamproblattidae. The discovery of *L. neuque* **sp. nov.** at an unusually high elevation highlights the persistence of biodiversity in remnant Andean forest habitats. Our findings underscore the need for a taxonomic revision of Lamproblattidae integrating morphological and genetic evidence.

Key words: Urban biodiversity, Bogota eastern hills, species naming contest

Resumen

Describimos *Lamproblatta neuque* **sp. nov.**, una nueva especie de cucaracha de bosques altoandinos (~2600 m s.n.m.) en las cercanías de Bogotá, Colombia. Esta especie se distingue por el noveno terguito en forma de W, la morfología única de las placas subgenital y supra-anal, así como por la estructura de la ooteca. Los machos presentan además una glándula tergal pequeña en la placa supra-anal, lo que amplía la variación conocida de este carácter dentro de Lamproblattidae. El hallazgo de *L. neuque* **sp. nov.** en un hábitat de alta montaña resalta la persistencia de la biodiversidad en fragmentos de bosque andino. Nuestros resultados subrayan la necesidad de una revisión taxonómica de Lamproblattidae que integre evidencia morfológica y genética.

Palabras clave: Biodiversidad urbana, Cerros Orientales Bogotá, concurso de nombrar una especie

Introduction

Lamproblattidae McKittrick, 1964 is a small family of Neotropical cockroaches comprising three genera—*Eurycanthablatta* Fritzsche, Zompro & Adis, 2008, *Lamproblatta* Hebard, 1919, and *Lamproglandifera* Roth, 2003—and eleven valid species (Cockroach Species File). Recent molecular and phylogenomic approaches recovered Lamproblattidae as a monophyletic lineage, however the placement within the Blattoidea is still uncertain (Evangelista *et al.* 2019b, Djernæs & Murienne 2022, Deng *et al.* 2023). In addition, the phylogenetic relationships among the three genera have yet to be tested.

Accepted by L. Vidlicka: 14 Jan. 2026; published: 24 Mar. 2026

The genus *Lamproblatta* was established by Hebard (1919), with *Lamproblatta albipalpus* Hebard, 1919 as the designated type species. He noted its closest morphological resemblance to the genus *Eurycotis* Stål, 1874. Distinguishing characteristics of *Lamproblatta* include its apterous condition, a less flattened body resulting in a more convex dorsal surface, a white spot at the end of the supra-anal tergite, and elongated, slender tarsal joints, with the metatarsus longer than the combined length of the succeeding joints. Hebard (1919) also transferred two species previously described under the genus *Stylopyga* Fischer, 1846 to *Lamproblatta* (*L. meridionalis* (Bruner, 1906) from Trinidad and Tobago and *L. zamorensis* (Giglio-Tos, 1898) from eastern Ecuador) and described *L. albipalpus* from northern Colombia.

Rehn (1930) later provided a comprehensive summary of the genus and described four additional species for this genus. He identified two distinct species groups based on palpal morphology. In the first group (*zamorensis* species group), the palpi are robust in both lateral view and when extended, with the penultimate segment moderately narrowing toward the base and the antepenultimate segment relatively thick (*L. zamorensis*, *L. mimetes* Rehn, 1930, and *L. albipalpus*). In the second group (*meridionalis* species group), the palpi are slender in both lateral view and when extended, with the penultimate segment narrowing significantly toward the base and the antepenultimate segment proportionally thinner (*L. gorgonis* Rehn, 1930, *L. ancistroides* Rehn, 1930, *L. romani* Rehn, 1930, and *L. meridionalis*).

Roth (2003) distinguished *Lamproglandifera* from *Lamproblatta* based on a specialized feature of the male‘s supra-anal plate, which bears a distinct patch of yellowish setae oriented anteriorly and medially (Figure 1). He also formalized Rehn's (1930) species groups, naming them *zamorensis* (Group I) and *meridionalis* (Group II), and assigned *Lamproblatta flavimaculata* Princis, 1946 to the *meridionalis* group. In addition, he expanded the diagnosis of *Lamproblatta*, with the following traits: the front femur's anteroventral edge with a line of spines and tarsal morphology, in males with unspecialized abdominal tergites and symmetrical or subsymmetrical subgenital plate with two widely separated cylindrical styles and females with a valvular subgenital plate.

In 2008, Fritzsche & Zompro described *Eurycanthablatta pugionata*, an apterous species characterized by a unique, large metafemoral spine present only in males. The male‘s internal genitalia exhibit a left-side resemblance to *Cryptocercus punctulatus* Scudder, 1862, and a right-side similarity to *Lamproblatta albipalpus*, while the female‘s internal genitalia closely resemble those of *L. albipalpus*. These morphological traits supported the authors‘ decision to place *Eurycanthablatta* within Lamproblattidae.

Since these foundational studies, few new species have been described within the family. However, Evangelista *et al.* (2019a) recently added *Lamproblatta antoni* Evangelista, Kotyková Varadínová and Jůna, 2019 from French Guiana, a species that differs significantly from previously described males in genital morphology, further expanding the diversity of the genus.

Of the eleven species currently described within Lamproblattidae, nine belong to *Lamproblatta*, with three recorded in Colombia—*L. albipalpus, L. ancistroides*, and *L. gorgonis*.

Here, we describe a new species from the eastern hills of Bogotá, the capital district of Colombia, marking the fourth species of this genus recorded in the country and highlighting this country as a potential hotspot for its diversity. The species was discovered within the Universidad de los Andes campus, representing the first species description from this location. Despite the heavy urbanization of the metropolitan area, patches of forest along its eastern edge continue to sustain biodiversity. Notably, the high elevation (~2600 m a.s.l.) is an unusual habitat for this family, which has predominantly been recorded below 2000 m a.s.l. Additionally, *Lamproblatta neuque* **sp. nov.** (Figure 1) exhibits unique abdominal tergites including subgenital and supra-anal plates in both sexes, distinguishing it from all other known species in the genus.

Materials and Methods

Morphological methods

All specimens are deposited in the ANDES-E, Universidad de Los Andes (Bogotá). For diagnosis, the papers by Herbard (1919), Rehn (1930), Evangelista *et al.* (2016, 2019a) were used. For descriptions, scaled pictures using the Carl Zeiss 474025 objective of the specimens were used to measure them using the software ImageJ 1.53t. Total length and abdominal length do not include appendages. Laboratory photographs: Leica M205 FA stereomicroscope at the imaging microscopy facility Microcore (μ-core) at La Universidad de los Andes and DinoScopeLite Edge

Digital Microscope AM4115ZT. In addition, we excised the male genitalia from specimens and carefully hand illustrated, digitalized, and edited using Adobe Illustrator and Photoshop version 24.2.0. Morphological terminology for genitalia follows McKittrick (1964) unless otherwise noted. *L. albipalpus* genitalia drawings in McKittrick (1964) and Klass (1997) and the recent descriptions and drawings of *L. antoni* (Evangelista *et al.* 2019a) and *L. ancistroides* (Evangelista *et al.* 2016) were used as comparative reference.

We borrowed from the Entomological Collection at the Museum of Comparative Zoology in Harvard (MCZH-E), the types of *Lamproglandifera flavoglandis* Roth, 2003, for morphological comparison; we took pictures at the imaging facility the Department of Museums and Research Collections of the University of Alabama.

Molecular and barcoding methods

To double check the taxonomic identity, genetic diversity and test their position with closely related cockroach species we extracted the DNA from one middle leg using the DNeasy Qiagen Blood and Tissue Kit following the manufacturer's protocol for six specimens and a leg cleanse of *Lamproglandifera flavoglandis* paratype (MCZ-35077). We amplified the classical mitochondrial barcoding gene—*Cytochrome Oxidase I* (~658 bp)—using the classical Folmer *et al.* (1994) primers LCO1490 and HCO2198 and annealing temperatures of 48–51°C. The posterior sequencing was performed in Macrogen Inc (Korea) for *L. neuque* **sp. nov.** and Psamogen Inc. (USA) for *Lamproglandifera flavoglandis*. All chromatograms were revised and assembled in Geneious R9 (Kearse *et al.* 2012). We retrieved additional sequences for the *cox I* gene of closely related taxa based in the most recent phylogenetic frameworks for the classification of Blattoidea (Evangelista *et al.* 2019b, Djernæs and Murienne 2022, Deng *et al.* 2023) from GenBank (Table 1). The low-quality mitochondrial COI sequence obtained from the *Lamproglandifera flaviglandis* museum specimen (voucher MCZ:Ent:35077) is available at Zenodo (Sánchez Herrera *et al.*, 2025; https://doi.org/10.5281/zenodo.17202027. We calculated a Neighbor-Joining tree based on the pairwise genetic distances using the R package ape (Paradis & Schliep 2019). We reconstructed a Maximum Likelihood (herafter ML) tree to check the taxonomic identity using IQ-Tree web server (Trifinopoulos *et al.* 2016) and a Bayesian Inference (hereafter BI) tree using BEAST v2.5 (Bouckaert *et al.* 2019). For the ML tree we ran 10000 pseudo replicates of both support values, UF bootstraps and aSHLRT. For the BI in 4 MCMC runs were performed, we provide the substitution model selection parameters calculated in IQ-Tree to set the priors and run it for the fifty-thousand million generations and sample every 1000. We checked proper convergence of all the parameters using Tracer v 1.7.2 and then obtained the maximum credibility tree after 10% burning in Tree Annotator. All trees were visualized in FigTree v 1.4.4 and annotated using the R package ggtree (Yu *et al.* 2017). Finally, we drew a Minimum Joining Network only among the other *Lamproblatta* available sequences to see the genetic diversity of the *coxI* within this genus using in PopArt (Leigh & Bryant 2015).

TABLE 1. List of ***cox I*** gene sequences included in this study. Sequences were retrieved from GenBank based on recent phylogenetic frameworks for Blattoidea classification (Evangelista *et al.* 2019b, Djernæs & Murienne 2022, Deng *et al.* 2023). Newly generated sequences for *Lamproblatta neuque* **sp. nov.** are highlighted in grey.

Species	Accession Number/DOI	Source
Lamproblatta albipalpus	MG882233	GenBank
Lamproblatta albipalpus	KP986416	GenBank
Lamproblatta sp.	MG882222	GenBank
Cryptocercus punctulatus	MG882217	GenBank
Lauraesilpha antiqua	OM109221	GenBank
Tryonicus parvus	MG882230	GenBank
Rhinotermes marginalis	EU253851	GenBank
Lamproglandifera flavoglandis	Zenodo: 10.5281/zenodo.17202027	This study—Low-quality museum specimen; trimmed longest ORF
Lamproblatta neuque **sp. nov.**	PP358753	This study
Lamproblatta neuque **sp. nov.**	PP358754	This study
Lamproblatta neuque **sp. nov.**	PP358755	This study
Lamproblatta neuque **sp. nov.**	PP358756	This study

We georeferenced all the reported records for this family including the ones in Rehn (1930) using Google Earth. The map was composed using Hole-filled SRTM for the globe Version 4 elevation models with 90 m spatial resolution, downloaded from http://srtm.csi.cgiar.org (Jarvis *et al.* 2008). Elevation data and longitude/latitude coordinates were taken in the field with a Garmin Etrex GPS. Additional occurrence data for the other species was retrieved from GBIF, only species rank data was reproduced in the map.

Results

Lamproblatta neuque sp. nov.

Holotype: COLOMBIA, 1 male, Cundinamarca Department, Bogota Distrito Capital, nearby Centro Deportivo Uniandes La Gata Golosa, 2600 masl, Lat: 4.604134N, Long: -74.065800W collected manually, Sept 19–20, 2023, E. Realpe & P. Realpe leg. (ANDESE-31116)

Female Paratype: COLOMBIA, 1 female, Cundinamarca Department, Bogota Distrito Capital, nearby Centro Deportivo Uniandes La Gata Golosa, 2600 masl, Lat: 4.604134 N, Long: -74.065800 W collected manually, Sept 19–20, 2023, E. Realpe & P. Realpe leg. (ANDESE-31117)

Paratypes: same as holotype. Date collected: 3 females, Oct 10, 2018, M. Sánchez-Herrera & E. Realpe leg.; (ANDESE 31122, 31123, 31124, [DNA voucher LAMP02, LAMP03, LAMP04]. 2 females, 1 male nymph, Oct 16, 2018 M. Sánchez-Herrera & E. Realpe leg. (ANDESE 31129, 31120, 31121); 1 male, 3 females Sept 19–20, 2023. P. Realpe & E. Realpe leg. (ANDESE 31118 [DNA voucher LAMP10], 31119, 31120, 31127)

Diagnosis

This species largely conforms to the diagnostic characters proposed by Roth (2003) for *Lamproblatta*. It is apterous, with a general body structure typical of the genus. The anteroventral margin of the fore femur bears a row of spines that are approximately equal in length, with the proximal spines more widely spaced than the distal ones. This spine row ends in two distinctly larger spines (Figure 2). Pulvilli are present on the first four proximal tarsomeres. In males the first hind tarsomere is distinctly inflated (Figure 3), a condition also observed in *Lamproblatta flavomaculata* and *L. mimetes*. In contrast, the female paratype has a non-inflated first tarsomere (Figure 3), resembling the condition found in *L. romani* and females of *L. albipalpus*. The tarsal claws are symmetrical and simple, with well-developed arolia (Figure 3).

In males, the subgenital plate is symmetrical or slightly asymmetrical, bearing two widely spaced cylindrical styli (Figure 4). The supra-anal plate exhibits a prominent white macula. In females, the subgenital plate is valvular (Figure 5).

Based on the palpal morphology used by Rehn (1930) to define two species groups (later formalized by Roth 2003) *Lamproblatta neuque* **sp. nov.** aligns with the *meridionalis* species group (Figure 3). Members of this group have slender palpi, with the penultimate segment narrowing basally and the antepenultimate segment proportionally thinner than that of *L. albipalpus*. The subgenital plate bears unequal styli, as also seen in *L. albipalpus*, *L. romani*, and *L. meridionalis*.

Lamproblatta neuque **sp. nov.** can be distinguished from the closely related *L. antoni* and *L. albipalpus* by the shape of the supra-anal plate and the structure of the male genitalia. In *L. neuque*, the supra-anal plate is trapezoidal and features two conspicuous sockets (one anterior and one posterior) and a notably more prominent white macula in the posterior half (Figure 4).

The supra-anal plate is morphologically similar to those of *L. romani* and *L. ancistroides*. However, *L. neuque* **sp. nov.** uniquely possesses a specialized tergal gland on the male supra-anal plate (Figure 6), comparable to that observed in *Lamproglandifera flavoglandis*. In the latter, this gland bears a distinct patch of yellowish setae oriented anteriorly and medially (Roth, 2003). In contrast, the gland of *L. neuque* **sp. nov.** appears to be smaller (Figure 6).

A further distinctive feature is found in abdominal tergites VII–X (Figure 7). The posterior margin of tergite VII bears two slight lateral projections, with a shallow concavity between them. Tergite VIII lacks these projections and displays a uniformly shallow concavity along its posterior edge. Tergite IX is distinctly diagnostic, with a W-shaped posterior margin, a character not observed in other known species of *Lamproblatta* and likely associated with the underlying tergal gland structure (Figures 4 and 7). The male genitalia exhibit the typical L3 phallomere morphology of the genus, but the L2d phallomere possesses a uniquely c-shaped hook, a feature not recorded in other species (Figures 8).

Although the presence of the specialized tergal gland may suggest placement within *Lamproglandifera*, our molecular results (see below, Figure 9) are inconclusive regarding the phylogenetic position of *Lamproglandifera* within Lamproblattidae. Mitochondrial DNA fragments from *L. neuque* **sp. nov.** are more closely related to other *Lamproblatta* species than to *Lamproglandifera* (Figure 9). Given this molecular evidence and the morphological similarities, we adopt a conservative taxonomic approach and assign this species to *Lamproblatta*, pending a broader phylogenetic and taxonomic revision of the family.

The variability of tergal gland specializations within Blattodea has been previously documented (Roth 1969), further justifying caution in taxonomic reassignment based solely on this character.

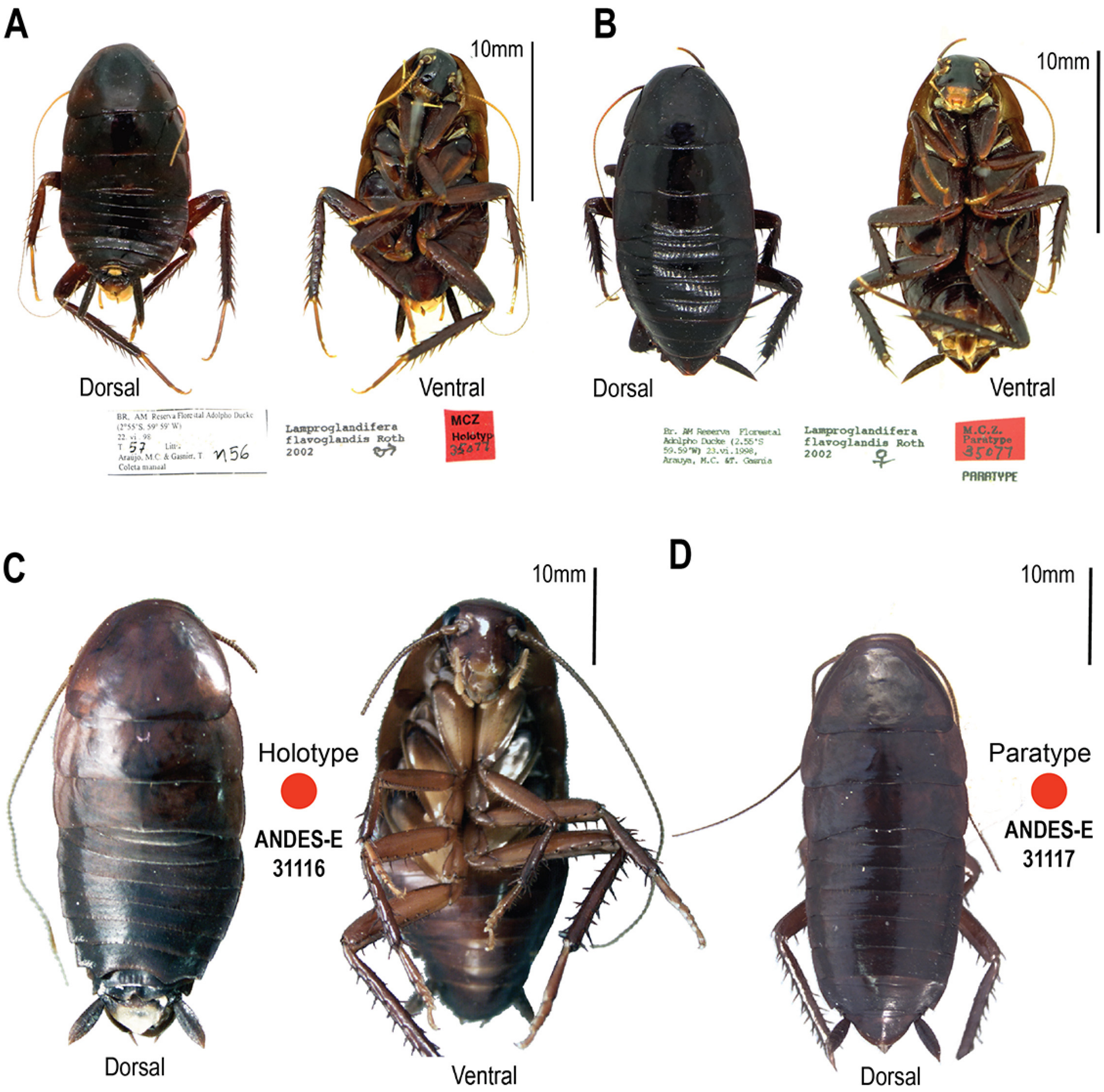

FIGURE 1. *Lamproglandifera flavoglandis* Roth, 2003 and *Lamproblatta neuque* **sp. nov.** types. **A–B.** *Lamproglandifera flavoglandis,* **A.** Male holotype. **B.** Female paratype. **C–D.** *Lamproblatta neuque* **sp. nov. C.** Male holotype. Voucher number: ANDESE-31116. Dorsal and ventral view. **D.** Female paratype. Voucher number: ANDESE-31117. Dorsal view.

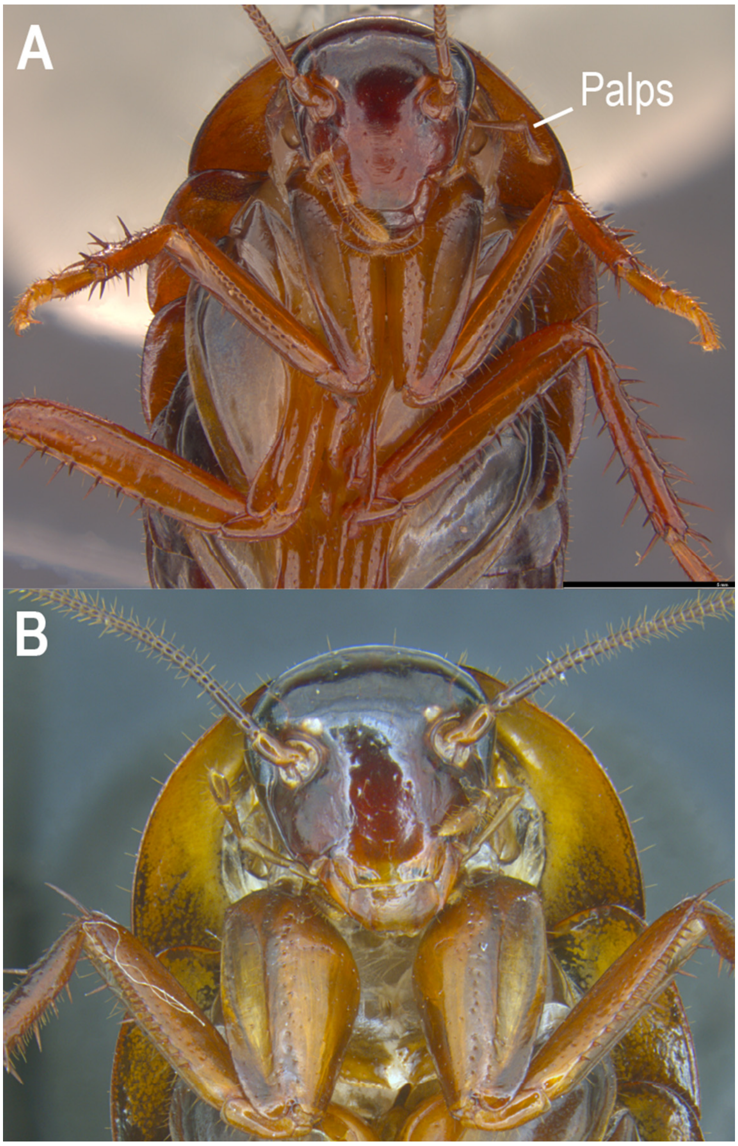

FIGURE 2. *Lamproblatta neuque* **sp. nov.**—head, ventral view. **A.** Male holotype, **B.** Female paratype.

A further diagnostic feature is found in the ootheca morphology. The keel of the ootheca in *L. neuque* **sp. nov.** is tall with well-defined serrations and a distinct shape that differs from those of *L. romani* and *L. albipalpus* (Roth 1971). As in other *Lamproblatta*, the keel forms an air chamber by the fusion of both halves, with small, regularly spaced openings aligned over each egg (Roth 1971). Given these structural differences, the ootheca provides valuable species-level diagnostic characters for *L. neuque* sp. nov (Figure 10).

***Etymology**:*

This name was proposed by the alumni Camilo Gómez Garzón of La Universidad de los Andes who won the internal naming contest launched by the authors and the Science Faculty within the university. This contest aimed to make this species description process more inclusive to all members of the university community and improve their sense of biodiversity appreciation. Overall, we received a total of 40 name proposals and after a careful consideration of the authors and representatives of the Science faculty as the selection committee his proposed name won. For more information about the application process please follow this link: https://ciencias.uniandes.edu.co/index.php/51-noticias-de-investigacion/516-nombra-la-especie-uniandina.

The word "*neuque*" is a Muisca toponym associated with the Arzobispo River, a river that runs through a large part of Bogotá, and it is believed to be the name that the Muisca inhabitants of the Bogotá savanna gave to this river.

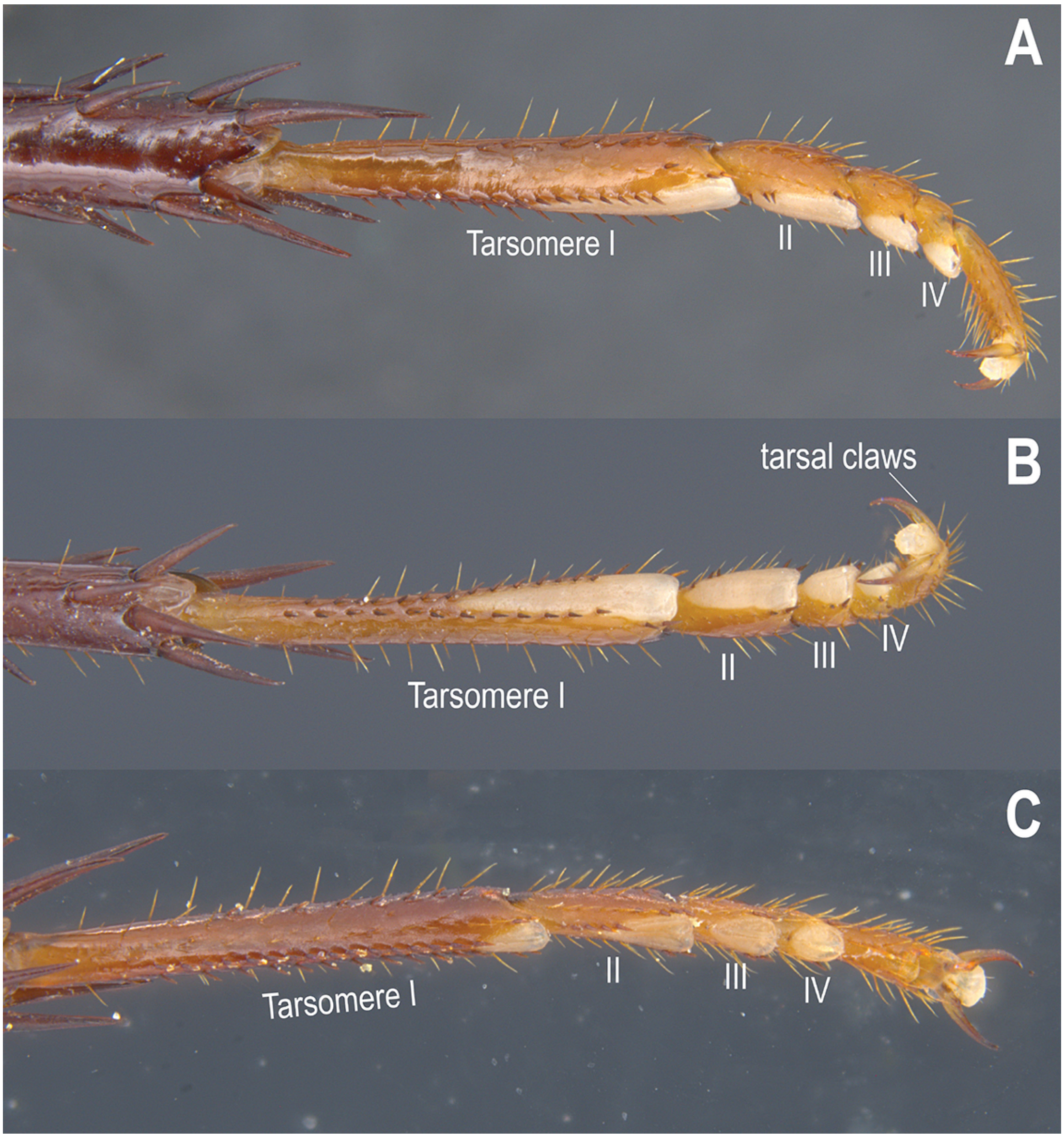

FIGURE 3. *Lamproblatta neuque* **sp. nov.**—tarsomeres. **A.** Holotype lateral view, **B.** Holotype ventral view. **C.** Paratype ventral view.

Description of the Holotype

Measurements (mm): Total length 18.2, pronotum length 4, pronotum width 6, supra-anal plate: base width 0.81, tip width 0.18.

Coloration: Dorsally reddish-dark brown, ventral coloration is generally reddish-brown, darkening towards the sides. Polished integument with some short setae and barbs on the posterior segments.

Head: Antennae very long, filiform, and extend beyond the abdomen (Figure 1). Scape is robust, three times longer than the pedicel, flagellum long and multi-ringed (Figure 2). The interocular space is slightly wider than the interantennal space, and the space between ocelli is slightly less than a mm. Compound eyes are small, black, oval-shaped, barely distinguishable from the very dark reddish-brown epicranium (Figure 2). Ocelli (fenestrae) are yellowish, elliptical touching the bases of the antennae but not the edges of the eyes. Frons amber, clypeus and labrum yellowish (Figure 2). Maxillary palps are long and light. Distal palpomere yellowish with a lateral dilation resembling a half-moon (Figure 2). Labial palps small, barely observable at the base of the maxillary palps.

Thorax: Pronotum large, twice the length of the mesonotum, which extends postero-laterally in a subparabolic shape (partially visible head from the dorsal view, Figures 1, 2). Mesonotum and metanotum are proportionally equal with slight paranotal projections. Wings are absent. Legs are dark yellow on the ventral side. Anteroventral margin of the front femur type A_2 (Roth 2003), a row of 16 equally sized spines followed by a larger pre-apical spine and an even larger apical spine (Figure 2). Posterior ventral margin of the front femur with three distal spines and one apical spine. Genicular spine is absent. Pulvilli present on four basal tarsomeres, metatarsal pulvillus slender and not swollen, bordered on each side by short spines (Figure 3). The hind tarsomeres exhibit the following spination pattern: the first hind tarsomere is inflated and bears a ventral row of approximately 12 pairs of short to medium-length spines, regularly arranged along the segment (Figure 3a, b). Around the midpoint (approximately the sixth pair, Figure 3b), a slight swelling is present, from which the spines diverge laterally toward the margins. Additionally, a developed pair of spines is present at the distal lateroventral region on each side (Figure 3). Tarsomeres II–IV are also slightly swollen and bear a pair of spines at the distal lateroventral region (Figure 3). Tarsal claws are simple, symmetrical. Arolia are present and small (Figure 3).

Abdomen: Abdominal tergites VII–X with distinct modifications (Figure 7a). Tergite VII with posterior margin bearing two slight lateral projections and a shallow median concavity (Figure 7a). Tergite VIII lacking lateral projections, with a uniformly shallow concavity along the posterior margin (Figure 7a). Tergite IX with a diagnostic W-shaped posterior margin, a unique feature within *Lamproblatta* (Figures 4, 7a).

Supra-anal plate and tergal gland: The supra-anal plate (tergite X) is symmetrical and trapezoidal in shape, with two shallow depressions located anteriorly and posteriorly, and a conspicuous white macula occupying the posterior half (Figure 4). The cerci insert latero-caudally at the plate‘s posterior corners, they are short, spindle-shaped, composed of approximately 10 segments (Figure 7). While internal structures were not examined in cleared preparation, a distinct patch of specialized tergal gland setae are visible externally between tergites IX and X (Figures 4, 6a,b), indicating a similarity to the one that was found in *Lamproglandifera* (Figure 6C). This glandular structure is not reported in other *Lamproblatta* species and supports the unique status of *Lamproblatta neuque* **sp. nov.**

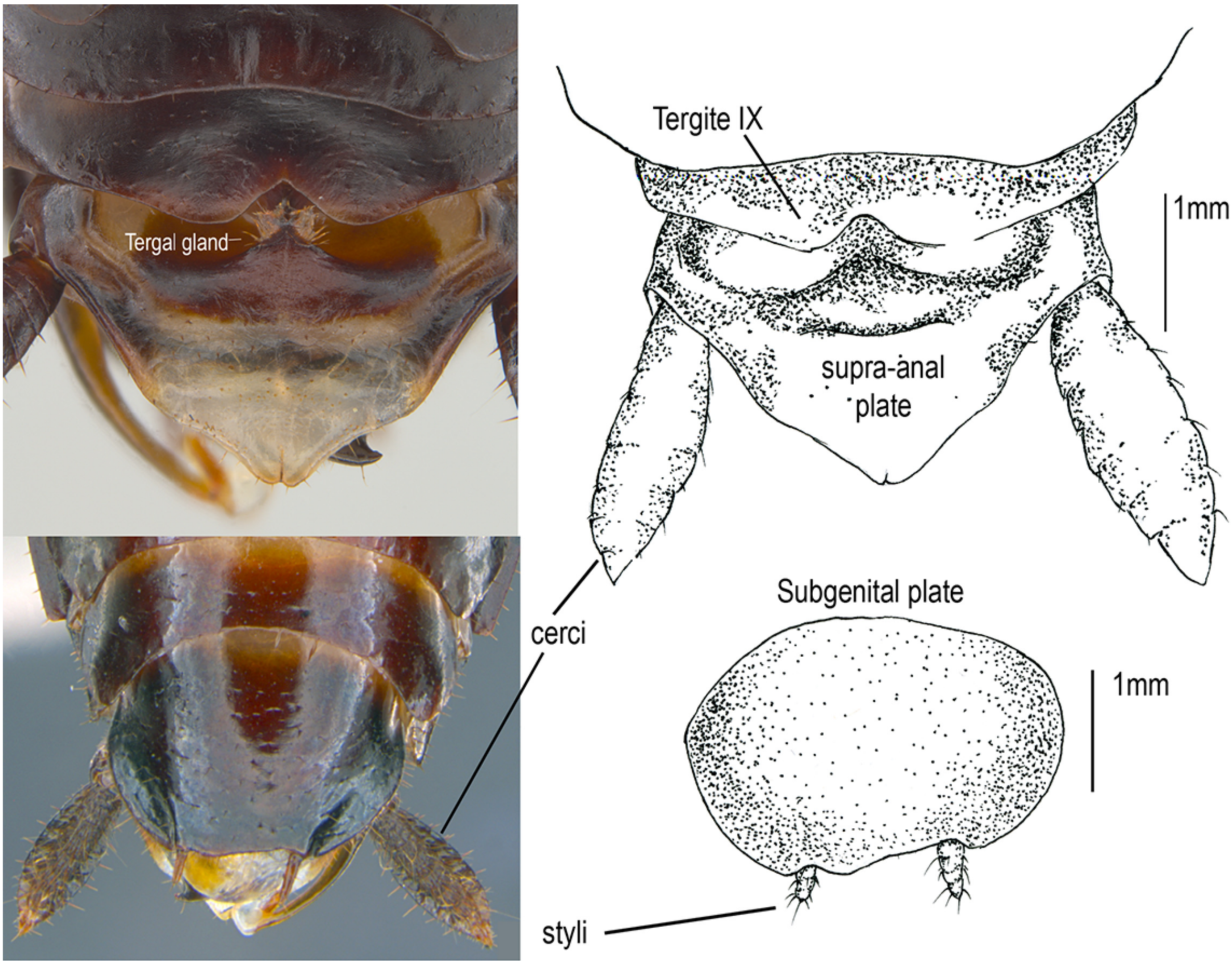

FIGURE 4. Abdominal tergites IX and X (supra-anal plate) and subgenital plate of holotype *Lamproblatta neuque* **sp. nov.** The tergal gland is visible in supra-anal plate. Both drawings were performed by Pablo E. Realpe.

FIGURE 5. *Lamproblatta neuque* **sp. nov.**—subgenital plate of the paratype female (ANDESE 31117), ventral view (scale = 5 mm).

Subgenital plate: Slightly asymmetrical oval with an irregular caudal edge, carrying a small pair of unequal cylindrical styles (Figure 4).

Genitalia: Left phallomeres: Left phallomere (L, Figure 8b), in ventral view, phallomere L3 is long and slender with a geniculate hook at the end (similar in species of the genus) and bordered by a white membranous portion. L2d has a thick caudal projection and a conspicuous c-shaped or hook-shaped caudal process. Phallomere L1 is a simple flattened oval. *Right phallomere*s (R, Figure 8c), in ventral view, phallomere R1 in its most distal portion has a sclerite perpendicular to the rounded basal with a more sclerotized edge. The perpendicular sclerite has a very small spine in the medial position. We acknowledge the need for more clearing processes of the genitalia to properly identify the distinct phallomeres.

Variation in the male paratypes

There is variation of total size across different stages in the development of the nymphs. See measurements for nymph males in mm: Total length 15 (+/- 0.4), pronotum length 4 (+/- 0.1), pronotum width 6 (+/- 0.15).

Description female paratype

Coloration: Coloration is slightly lighter, with the white spot on the supra-anal plate being notably evident (Figure 1).

Head, thorax and abdomen: Similar to males, except broader, particularly towards the abdomen (Figure 7b), where this characteristic is progressively more pronounced towards the caudal region. The female paratype shows a row of about 15 pairs of ventral spines on the first tarsomere, more prominent medially and slightly longer distally, with no apparent swelling or lateral displacement of the spines (Figure 3c). A pair of spines is also present at the distal lateroventral region in all tarsomeres (Figure 3c).

Supra-anal plate: No white spot, but it has a slightly lighter color compared to the other tergites on the rest of the abdomen, subtrapezoidal in shape with a concave posterior margin (Figure 5).

Subgenital plate: Symmetrical bivalve pyramid with a vertical groove in the center (Figure 5).

Measurements (mm): Total length 18.5, pronotum length 5, pronotum width 6.6.

Ootheca: consistent with the general structure described for *L. albipalpus* (Lawson 1967), characterized by a prominent median keel and concave lateral margins (Figure 10). The keels of *Lamproblatta* oothecae are typically tall and bear well-defined serrations or teeth. An air chamber forms within the keel by the union of the two halves, and small, uniformly spaced openings are present in the floor of the keel above each egg (Roth 1971).

DNA Barcode Identification

We obtained the mitochondrial COI barcode gene for six specimens (4 females and 2 males; GenBank accession numbers PP358753–PP358756) and for *Lamproglandifera flaviglandis* (MCZ:Ent:35077), which is available via Zenodo [10.5281/zenodo.17202027]. Our reconstructed ML and BI trees were inconsistent in the position of *Lamproglandifera*; however, we recovered a well-supported clade *Lamproblatta neuque* sp. nov as sister to *Lamproblatta albipalpus* and an undetermined species of genus *Lamproblatta* (Figures 9b). The minimum joining network shows that there are 96 mutations between *Lamproblatta albipalpus* from French Guiana and *Lamproblatta neuque* sp. nov (Figure 9c). The pairwise distance between these two species is between ~0.22–0.27, while the pairwise distance among the individuals from *Lamproblatta neuque* **sp. nov.** is ~0.0015. The sequence obtained for *Lamproglandifera flavoglandis* was not very clean, which produced a lot of missing data increasing the genetic pairwise distance among the clades. However, the NJ tree suggests that *Lamproglandifera* seems to be closer to the *L. albipalpus* clade rather than the *L. neuque* **sp. nov.** clade (Figure 9d). Despite the uncertainty of the position of the family Lamproblattidae within the phylogenetic classification of Blattoidea, our barcoding results support that this new species belongs to the genus *Lamproblatta* (Figure 9), however new phylogenomic data can clear the phylogenetic relationships among the species within Lamproblattidae.

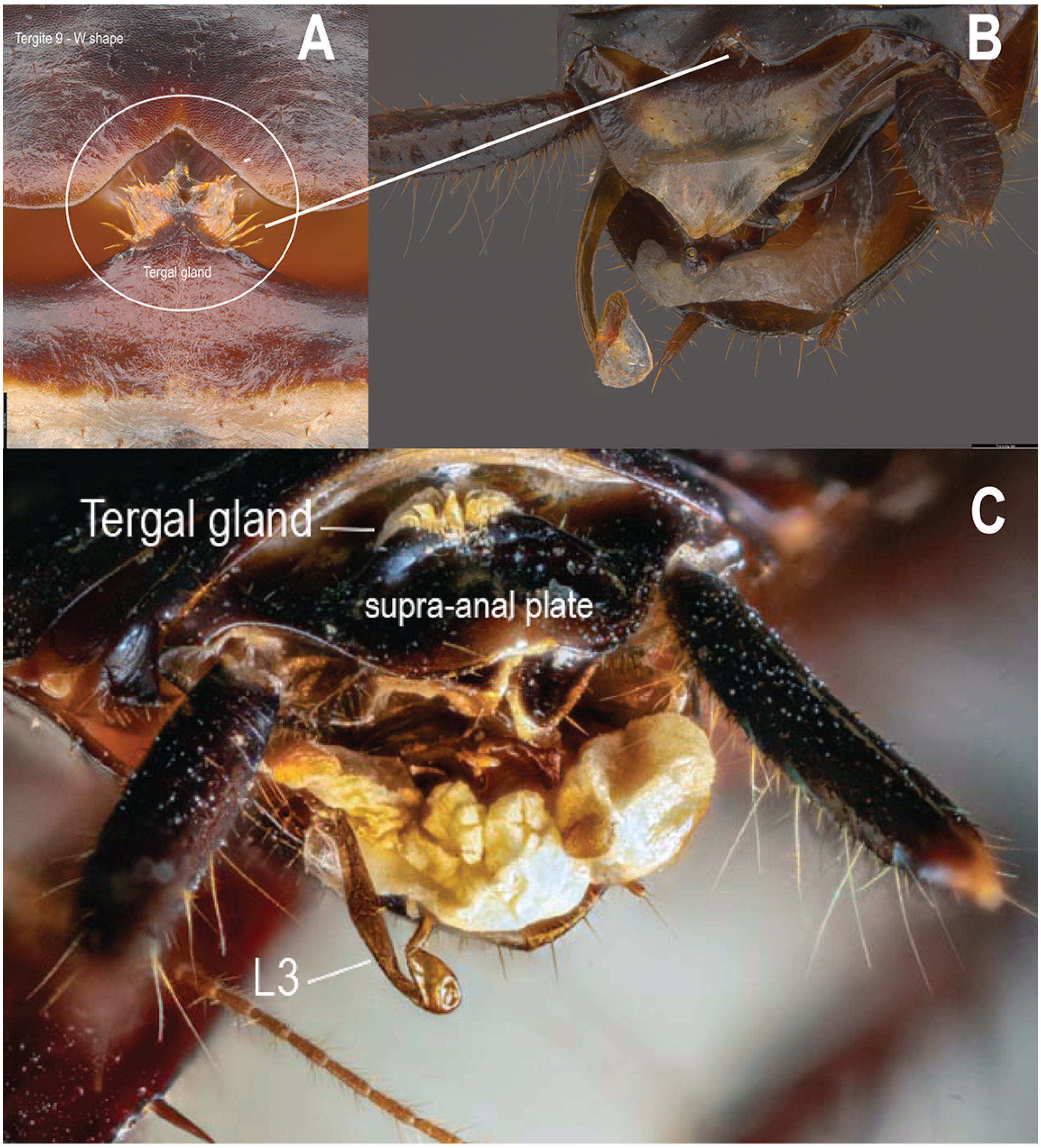

FIGURE 6. *Lamproblatta neuque* **sp. nov.**—unique tergal gland in the supra-anal plate of the holotype (A and B). C. Tergal specialized gland of *Lamproglandifera flavoglandis.*

Distribution

Lamproblatta neuque **sp. nov.** is distributed in Bogota's eastern hills (Los Cerros Orientales), which form part of the Andean eastern cordillera (Figure 11). This sets it apart from the compared species and other species reported in the northwestern region of South America and the Caribbean, which are typically found in lowlands, below 2000 meters above sea level. This species seems to be adapted to high elevations.

Biology

At the *Lamproblatta neuque* **sp. nov.** type locality area in the campus of the University of the Andes, we observed three very localized and consistent populations found under stacked decomposing logs (Figure 12), a result of campus maintenance activities. The largest log harbors the most significant colony, primarily composed of adult females, juveniles (nymphs), and a few males, to the extent that they were rarely found in several sampling attempts. Beneath the logs, there was a substantial amount of leaf litter and decomposing plant material, creating a microhabitat condition that favored their presence. Rarely did any specimens appear when searching in the surrounding leaf litter. This is the only location we have been able to find this species so we call for its protection, recent wildfires during the dry season in Bogota's eastern hills (Los Cerros Orientales) might have an important impact on other populations of these roaches in undescribed locations for these species.

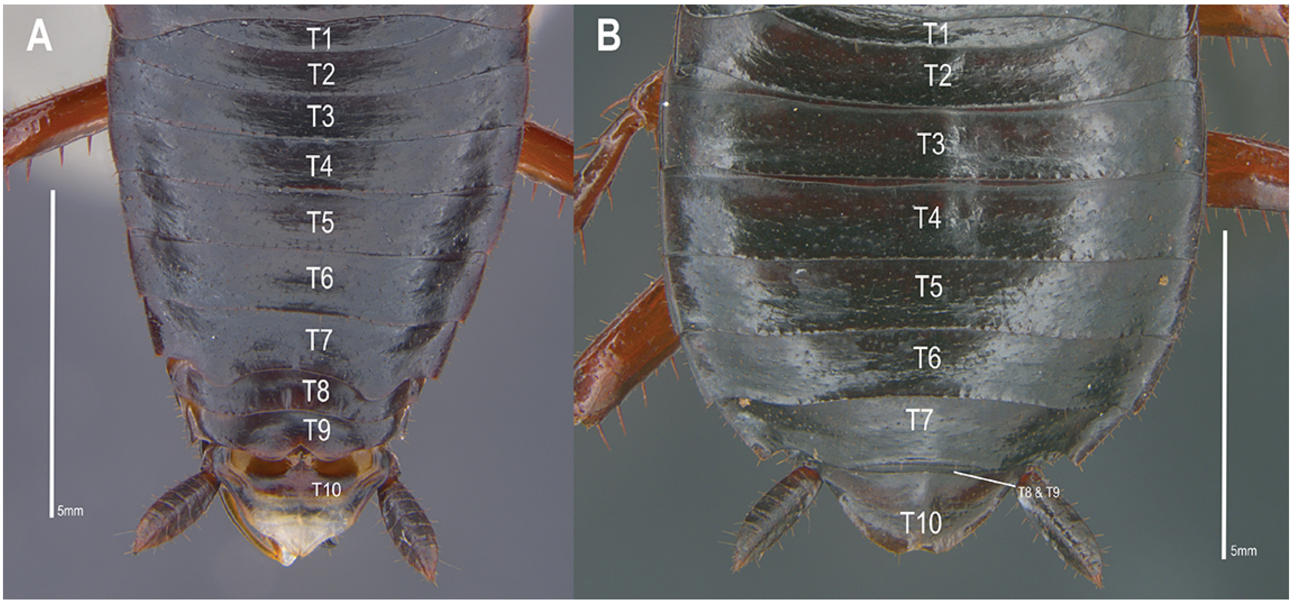

FIGURE 7. *Lamproblatta neuque* **sp. nov.**—abdominal tergites. **A.** Holotype male, **B.** Paratype female (both dorsal).

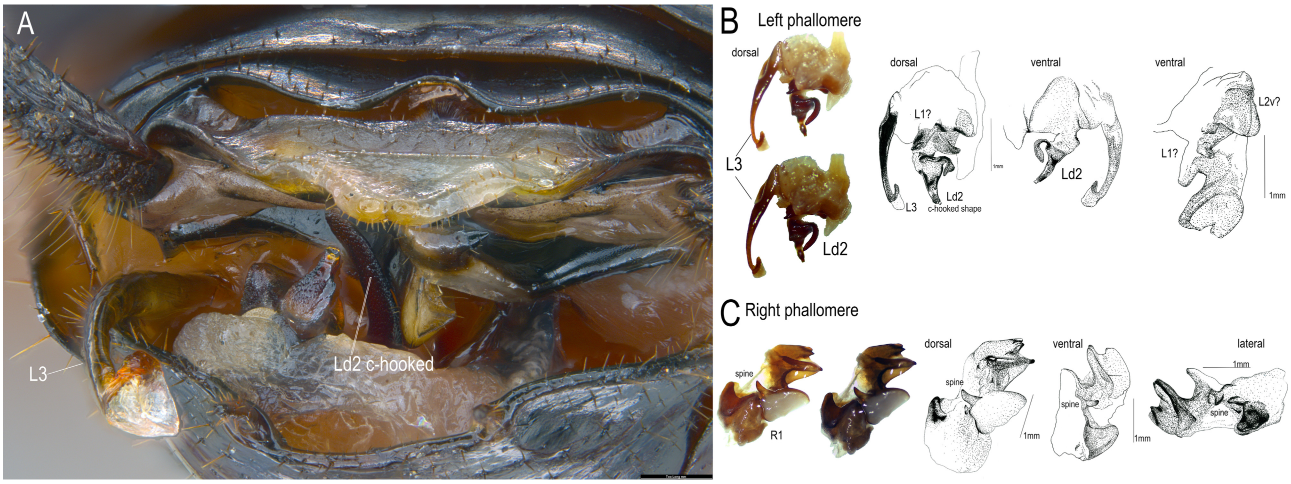

FIGURE 8. *Lamproblatta neuque* **sp. nov.**—genitalia. **A.** posterior view holotype. **B.** left and **C.** right phallomeres. All drawings were performed by Pablo E. Realpe.

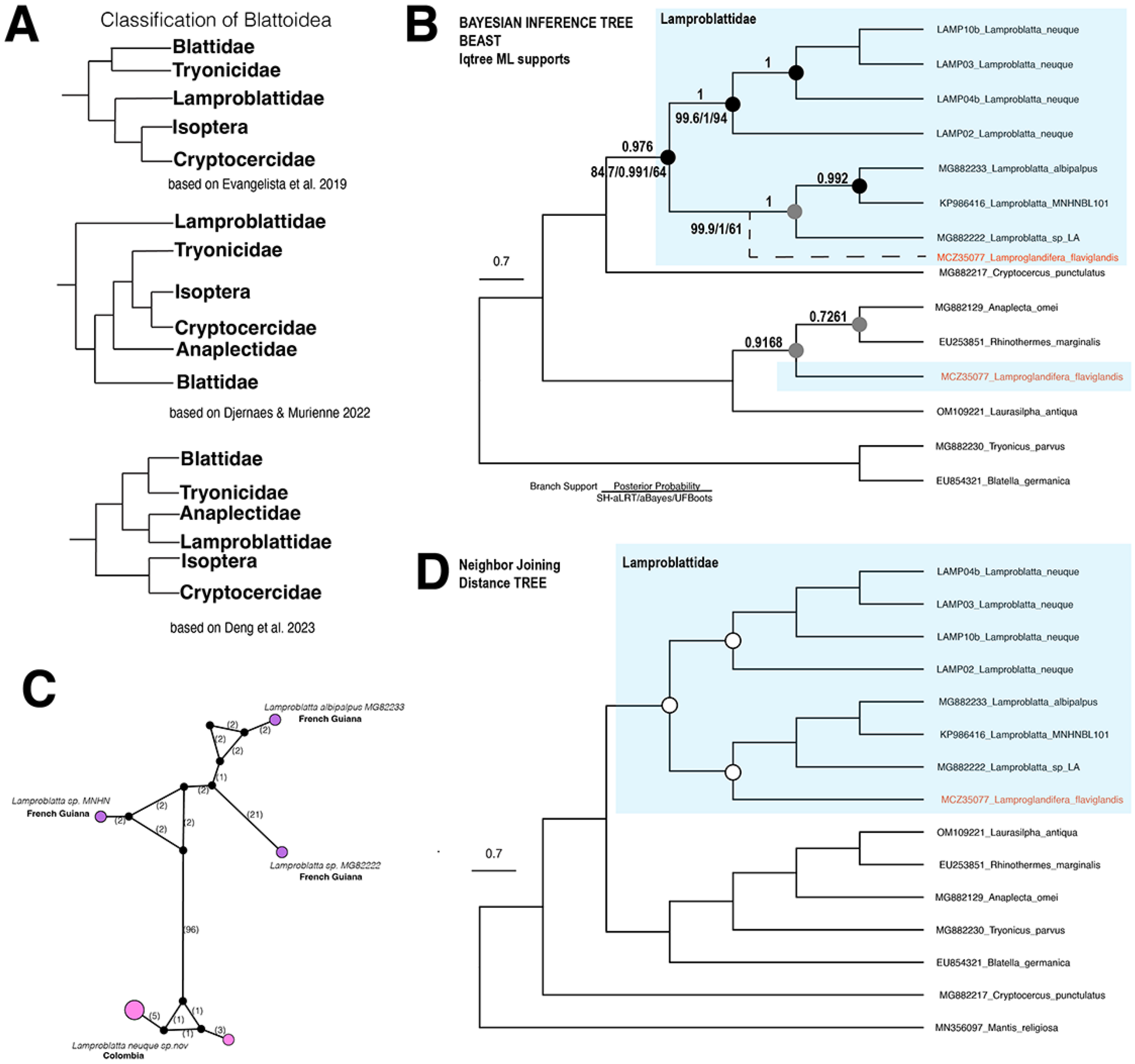

FIGURE 9. Evolutionary context for *Lamproblatta neuque* sp. nov. A. Recent classification disagreements based on molecular and phylogenomic data. **B.** Best Maximum Likelihood and Bayesian Inference topology recovered from the barcode gene. **C.** Minimum spanning network for the *Lamproblatta* clade, the numbers in the represent the number of mutations between the haplotypes. **D.** Neighbor Joining barcode distance tree.

Discussion

Our DNA barcoding data clearly place *Lamproblatta neuque* **sp. nov.** as a sister taxon to other *Lamproblatta* species, including *L. albipalpus* and several unidentified lineages from French Guiana, based on sequence data available in GenBank (Figure 9). However, the deeper phylogenetic placement of the family Lamproblattidae remains controversial. Although our molecular results support the inclusion of *L. neuque* **sp. nov.** within *Lamproblatta*, the broader relationships within Blattoidea are unresolved. In particular, the position of *Lamproglandifera*—a genus described by Roth (2003) and distinguished by the presence of a specialized tergal gland in the male's supra-anal plate (Figure 4)—varies depending on the dataset used, whether mitochondrial markers or transcriptomic data, resulting in incongruent topologies. Our findings are therefore inconclusive regarding the true placement of *Lamproglandifera* relative to *Lamproblatta*. Expanded sampling at both the genetic and taxonomic levels will be essential to resolve these phylogenetic uncertainties and to clarify the classification of Lamproblattidae.

One particularly informative character in *Lamproblatta* is the ootheca (Figure 10). In *L. neuque* **sp. nov.**, the ootheca exhibits a tall keel with well-defined serrations, forming a sealed air chamber by the union of both halves and bearing small, evenly spaced openings over each egg. This structure is consistent with that described in *L. albipalpus* (Lawson 1967) and aligns with Roth's (1971) observations that species in Lamproblattidae exhibit advanced rotational behavior in females during oviposition. The oothecal morphology in *L. neuque* **sp. nov.** is distinct from that of *L. romani* and *L. albipalpus*, providing additional species-level diagnostic value and reinforcing the importance of oothecae in taxonomic studies.

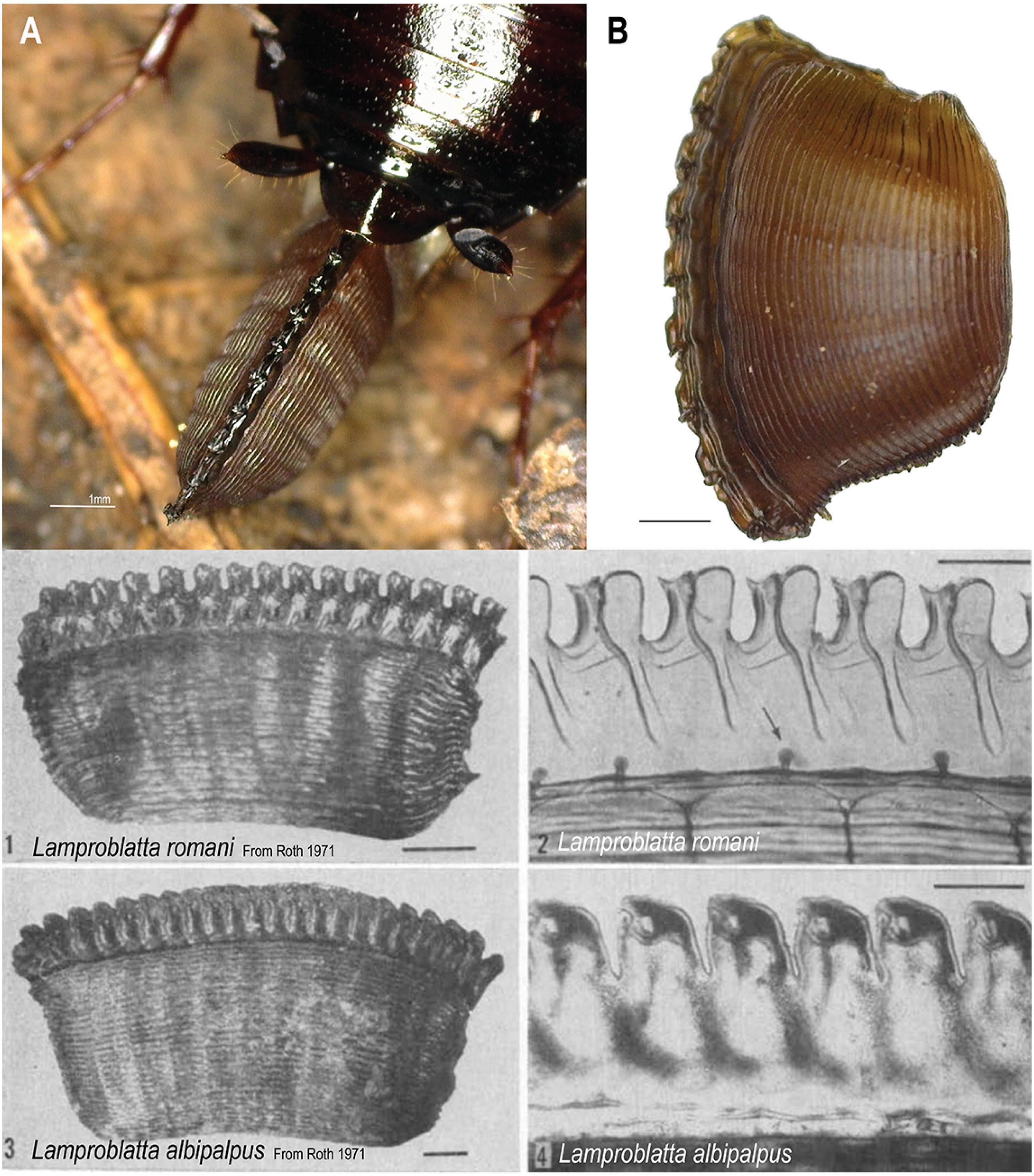

FIGURE 10. *Lamproblatta neuque* **sp. nov.**—ootheca. **A.** Female ovipositing an ootheca **B**. Ootheca, lateral view. Comparison of the keels and oothecae for *Lamproblatta romani* and *Lamproblatta albipalpus* reported by Roth (1971).

The need for a modern revision of this genus is pressing. The last comprehensive treatment of *Lamproblatta* was nearly a century ago by Rehn (1930), and since then, very little progress has been made, largely due to limited sampling and poor representation in collections. This has led to challenges in species-level identification and the continued reliance on outdated keys. Several species remain poorly known, with some described from a single sex or lacking critical diagnostic features. Roth's (2003) description of *Lamproglandifera* represented a significant step forward in recognizing morphological diversity within the group—particularly the presence of tergal glands in males—but its taxonomic placement has yet to be resolved with certainty. In this context, the discovery of *Lamproblatta neuque* **sp. nov.**, which shares features with both genera, underscores the importance of re-evaluating the current generic boundaries and revisiting older species descriptions with modern tools.

Taxonomy, though often underfunded, provides the essential framework for ecological and evolutionary research. Accurate species identification is a prerequisite for understanding patterns of biodiversity, monitoring ecosystem health, and implementing conservation strategies. As insect populations face increasing threats from climate change, habitat loss, and pollution (Wagner *et al.* 2021), the urgency to document and understand lesser-known taxa has never been greater. The discovery of new species like *L. neuque* **sp. nov.** highlights how much remain jg to be learned about our planet's biodiversity and how vital taxonomy is in this effort.

This discovery also offers a valuable opportunity to connect science with society. Found within a university campus, *Lamproblatta neuque* **sp. nov.** became the centerpiece of a naming contest organized by the Faculty of Science, allowing students and the broader public to participate in the traditionally specialized process of species description. Such initiatives not only foster public engagement but also raise awareness about the hidden diversity present even in urban or semi-urban environments. Encouraging public participation in biodiversity discovery can help build a more informed and conservation-minded society—one that recognizes the importance of preserving even the smallest and most cryptic organisms in our ecosystems.

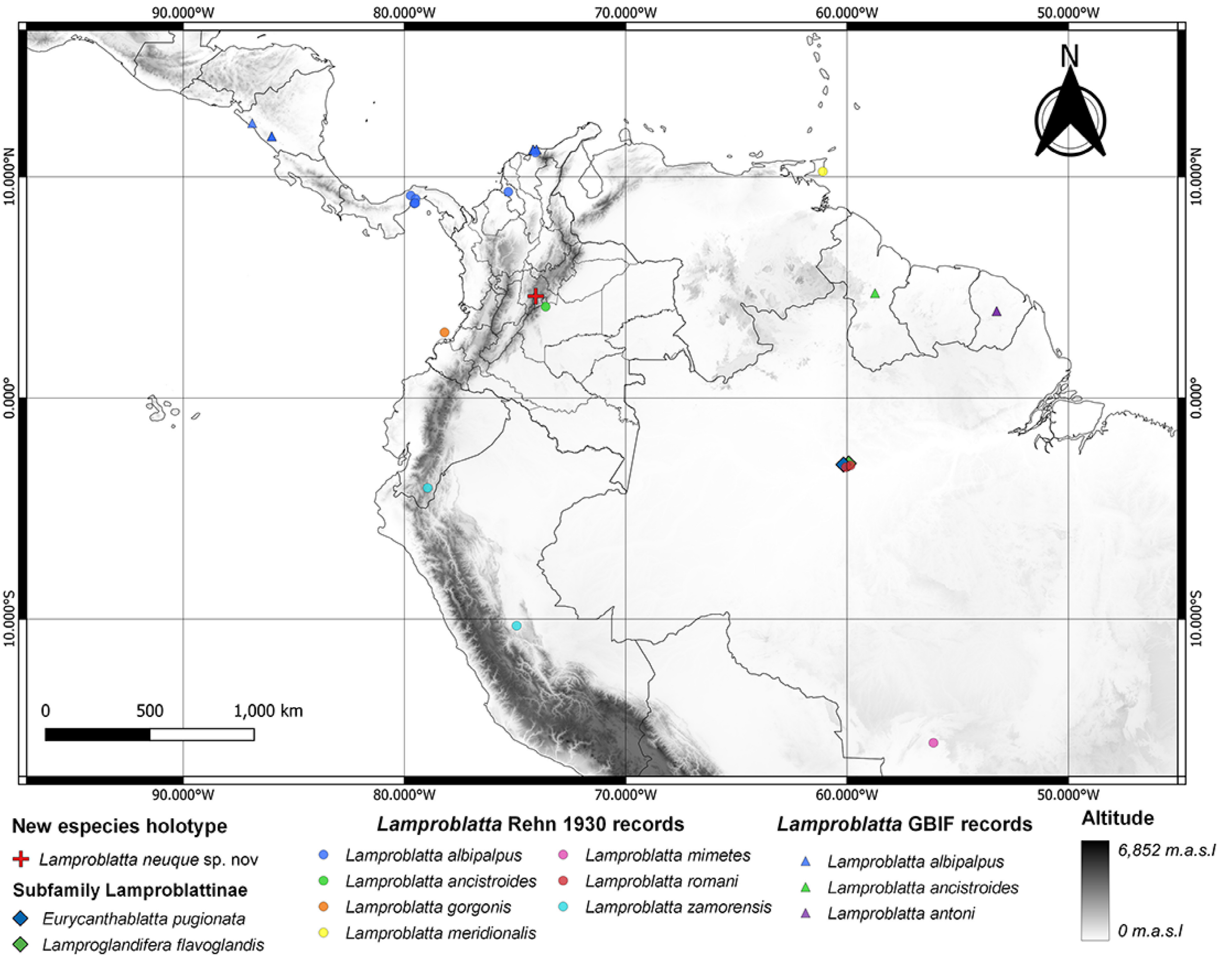

FIGURE 11. Distribution map for *Lamproblattidae*, including *Lamproblatta neuque* **sp. nov.**, *Lamproglandifera flavoglandis*, *Eurycanthablatta pugionata* and the other ten *Lamproblatta* species including the Rehn (1930) records and current GBIF records.

FIGURE 12. *Lamproblatta neuque* **sp. nov.**—live nearby typical wood material where they found in their type locality the Uniandes sport center “La Gata Golosa”.

Acknowledgments

We would like to express our sincere gratitude to Laura Sofía Moreno Rojas, David Jesús Laverde Pulido, and Luis Carlos García Rodríguez from the Faculty of Science, as well as Carlos Guarnizo from the Biocore facility at Universidad de los Andes, for their invaluable assistance in organizing and promoting the naming contest campaign. We also thank the microscopy facility (MicroCore—µ-core) at Universidad de los Andes for providing access to the Leica M205 FA stereomicroscope, with special appreciation to Adriana Montes for her support. Special thanks go to Ángela Sánchez from the Museo de Historia Natural Andes for her generous help and continued support.

We are especially grateful to Dr. Dominic Evangelista for his expert guidance during the revision of male genitalia. MSH and FM thank the Evolutionary Genetics Research Group at Universidad del Rosario for providing laboratory space for molecular procedures. MSH would also like to thank Crystal Maier and Samuel Howard from the Museum of Comparative Zoology, Harvard University, and Dr. John Abbott of the University of Alabama for facilitating the loan of *Lamproglandifera flavoglandis*, and give special recognition to Laney Woynaroski, University of Alabama Research and Collections intern, for photographing the type specimens. Lastly, MSH acknowledges Clubes de Ciencia 2018 for their contribution to the discovery of this species through the identification of suitable habitats during the DNA Safari Club program that year.

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