

# DISTRIBUTION RANGE EXTENSION OF THE AMAZON PYGMY GECKO *PSEUDOGONATODES GUIANENSIS* (PARKER, 1935) (SPHAERODACTYLIDAE: GEKKOTA) IN NORTHERN SOUTH AMERICA

AMPLIACIÓN DEL RANGO DE DISTRIBUCIÓN DEL GEKO ENANO AMAZÓNICO *PSEUDOGONATODES GUIANENSIS* (PARKER, 1935) (SPHAERODACTYLIDAE: GEKKOTA) EN EL NORTE DE AMÉRICA DEL SUR

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The genus *Pseudogonatodes* (Ruthven, 1915), belonging to the family Sphaerodactylidae, constitutes a group of small geckos, mainly semifossorial or cryptozoic, with cis- and trans-Andean distribution in northern South America (Avila-Pires, 1995; Avila-Pires & Hoogmoed, 2000; Esqueda et al., 2016). The genus shares characteristics with other sphaerodactylids, such as *Lepidoblepharis*, leading to the initial inclusion or synonymization of species (e.g., *Lepidoblepharis lunulatus*, later designated as *Pseudogonatodes lunulatus*; *P. furvus*, initially considered a synonym of *L. intermedius*, later recognized as a nominal species) (Ruthven, 1922; Parker, 1926; Roux, 1927). Currently, the genus *Pseudogonatodes* is diagnosed by the presence of a retractile claw between five scales, where the supralateral scales of the claw sheath are in contact through their length (Peters & Donoso, 1970; Avila-Pires, 1995).

Historically, taxonomic uncertainty has existed about some species in the genus *Pseudogonatodes*, resulting in a lack of understanding about the limits of the taxa and their true distribution. In the description of *P. amazonicus*, Vanzolini (1967) considered that the new species, along with *P. lunulatus* (Roux, 1927), *P. furvus* (Ruthven, 1915), and *P. guianensis* (Parker, 1935), could be intra-specific variation. Later, Huey & Dixon (1970) proposed *P. amazonicus* as a synonym of *P. guianensis*, a consideration followed by various authors (Hoogmoed, 1973; Avila-Pires, 1995). Particularly regarding the species *P. guianensis*, suggestions of geographical variation and morphological affinity with the conspecific *P. lunulatus* have been made (Avila-Pires, 1995; Hoogmoed & Avila-Pires, 2000). However, Esqueda et al., (2016)

recently discriminated the species *P. guianensis* and *P. lunulatus* based on morphometric and meristic characters. Therefore, at present, no evidence contradicts the validity of the species *P. guianensis* or suggests the existence of several different taxa under this name.

The genus *Pseudogonatodes* currently recognizes seven species, most of them with restricted distribution: *P. barbouri* (Noble, 1921) and *P. peruvianus* Huey & Dixon, 1970, are found in Amazonas and Cajamarca, in northwestern Peru; *P. furvus* (Ruthven, 1915), is located in the Sierra Nevada de Santa Marta, in the Colombian Caribbean; *P. gasconi* (Avila-Pires & Hoogmoed, 2000), is situated in the Acre region in northwestern Brazil; *P. manessi* (Avila-Pires & Hoogmoed, 2000), is found in the Central Coastal Range in the north of Venezuela; *P. lunulatus* (Roux, 1927) has distribution in the north of Venezuela; *P. guianensis* (Parker, 1935), has a wide distribution in the Amazon Basin and Guiana Shield (Huey & Dixon, 1970; Avila-Pires & Hoogmoed, 2000; Riveiro-Junior, 2015; Esqueda et al., 2016; Montes-Correa et al., 2021).

*Pseudogonatodes guianensis*, commonly named as the Amazon Pygmy Gecko, is a terrestrial and diurnal species that is highly adaptable to different ecosystems, inhabiting both primary and secondary terra firme forests, swampy areas, and disturbed habitats (Duellman & Mendelson, 1995; Vitt et al., 2005; Arteaga, 2023). The species is the most widely distributed species of the genus, with its distribution primarily cis-Andean (Avila-Pires, 1995; Riveiro-Junior, 2015). It has been recorded in Brazil, Guyana, Venezuela, Colombia, Ecuador, Peru, Suriname and



**Figura 1.** Fotografías de *Pseudogonatodes guianensis* (MHUA-R13964) de Curumani, Cesar, Colombia. Arriba espécimen in situ, abajo espécimen antes de la recolección final.

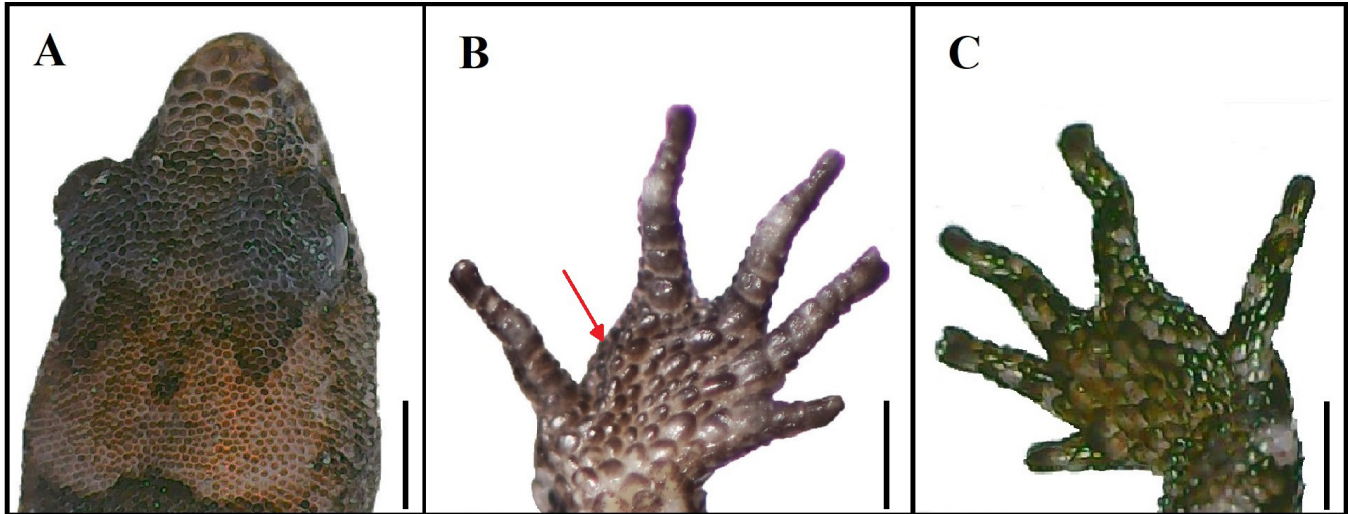
**Figure 1.** Photographs of *Pseudogonatodes guianensis* (MHUA-R13964) from Curumani, Cesar, Colombia. Top specimen in situ, bottom specimen prior to final collection.

French Guiana (Hoogmoed, 1973; Molina, 2001; Riveiro-Junior, 2015; Arteaga, 2023). In Colombia, it is known from the eastern flank of the Eastern Cordillera, Orinoquía and Amazon regions, specifically in the departments of Meta, Putumayo, Casanare,

Amazonas, Boyacá, Vaupés, and an isolated inter-Andean record in Tolima (GBIF, 2023; see Appendix 1).

On August 4, 2021, at 18:30 h, during a field trip, a lizard was observed on the rocky shore of the upper reaches of San Pedro





**Figura 2.** Ejemplar de *Pseudogonatodes guianensis* (MHUA-R13964). (A) vista dorsal de la cabeza, se observan tres escamas postrostrales y un área de luz en forma de "W" en la parte posterior de la cabeza; (B) vista ventral del pie, la flecha roja indica la planta del pie con una escamación heterogénea; (C) vista dorsal del pie, se observa una vaina de escamas supralaterales en contacto a lo largo de su longitud. Barra de escala = 1 mm.

**Figure 2.** Specimen of *Pseudogonatodes guianensis* (MHUA-R13964). (A) dorsal view of head, showing three postrostral scales and a "W"-shaped light area on posterior part of head; (B) ventral view of foot, red arrow indicates sole of foot with heterogeneous squamation; (C) dorsal view of foot, showing a sheath of supralateral scales in contact across its length. Scale bar = 1 mm.

Creek, on the Bella Luz farm, in the municipality of Curumaní, Cesar department, Colombia (9.169526° N, 73.416279° W; elevation 1,114 m a.s.l.; WGS 84 datum). The site is a riparian forest fragment with abundant leaf litter and understory vegetation, where other reptiles such as *Tretioscincus bifasciatus* (Duméril, 1851), *Polychrus marmoratus* (Linnaeus, 1758), *Gonatodes albogularis* (Duméril & Bibrón, 1836), *Stenocercus erythrogaster* (Hallowell, 1856), *Leptodeira ornata* (Bocourt, 1884), and *Bothrops asper* (Garman, 1883) were also recorded.

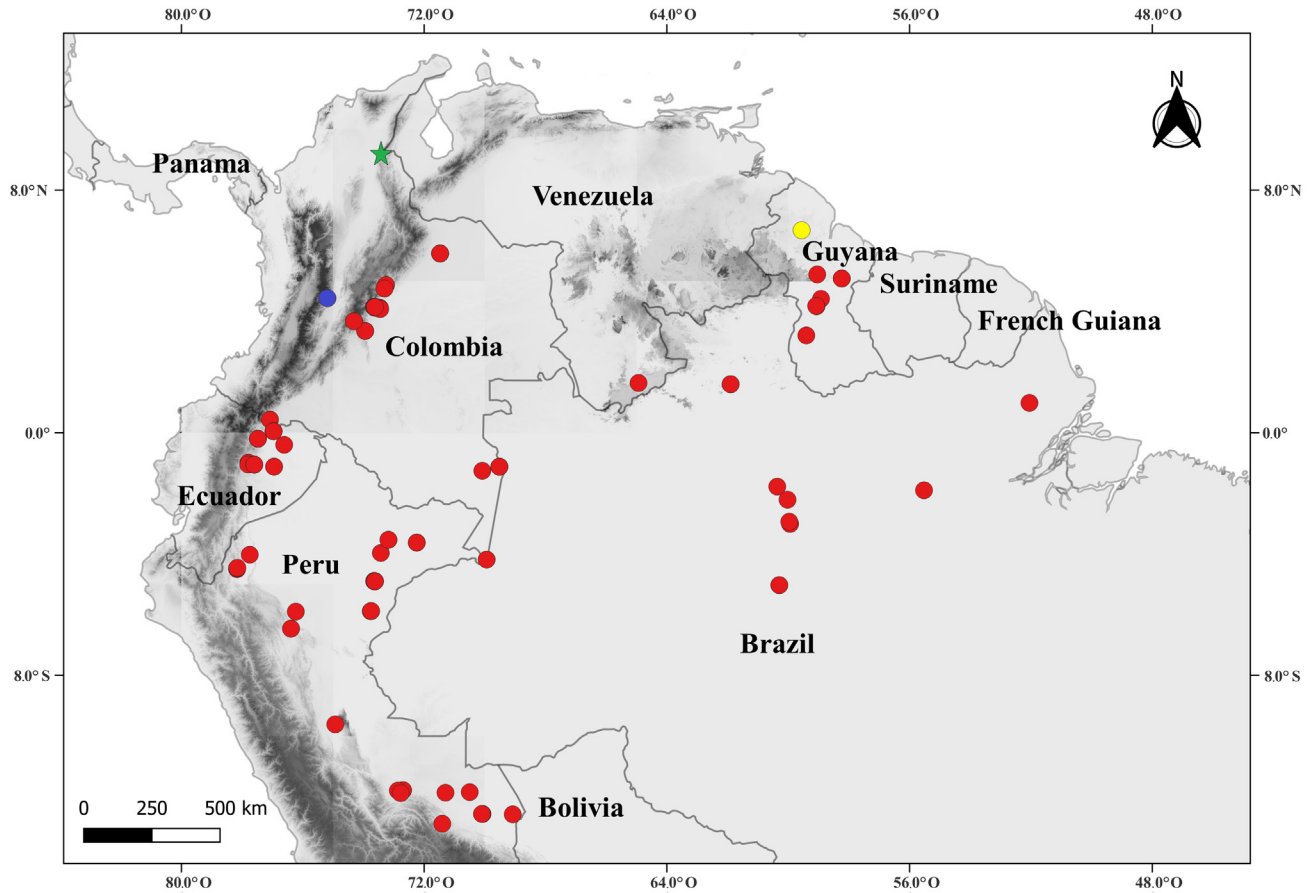
The specimen was photographed and euthanized it with 2% Roxicaine, muscle tissue (hind limb) was removed and preserved in 95% ethanol, then fixed it in a 10% formalin solution and preserved it in 70% ethanol. The specimen has been deposited in the Museo de Herpetología de la Universidad de Antioquia (MHUA) under the catalog number MHUA-R13964 (Fig. 1) and was collected under the authorization of the Autoridad Nacional de Licencias Ambientales (ANLA), resolution number 00644, dated April 7, 2021.

The specimen referred to in the present study is identified as the species *P. guianensis* based on the combination of characters described by various authors (see Dixon & Huey, 1970; Peters & Donoso, 1970; Avila-Pires, 1995), in parentheses values recorded for MHUA-R13964: 7 or fewer subdigital lamellae under the

fourth toe (7); an expanded third subdigital lamella (counting from the unguis sheath toward the base of the toe); head length contained five times in the snout-vent distance; 3-4 postrostral scales (3); conical to subconical dorsal scales; maximum snout-vent length 30 mm (24 mm); scales around midbody 86-105 (90), 36-47 ventrals in a longitudinal row (37), and 17-22 in a transverse row at midbody (19).

The species most similar to *P. guianensis* is *P. lunulatus*, although, according to Esqueda et al. (2016), they can be differentiated: *P. guianensis* has (vs. *P. lunulatus* in parenthesis) the sole of the foot with heterogeneous squamation (homogeneous squamation), tibia foot < 0.5 regarding the femur length (>0.5 regarding the femur length), and the first supralabial 0.5 or less regarding eye-nostril distance (> 0.5 to ≤ 0.7 eye-nostril distance) (Fig. 2).

This record signifies the northernmost occurrence of the species in South America and one of the few confirmed Andean records for the species *P. guianensis*. Consequently, the latitudinal distribution of the species extends approximately 420 kilometers from the north of the Casanare department (Hato Colossal municipality) to the east of Cesar department (Curumaní municipality), both sites in Colombia (Fig. 3; Appendix 1.). Thus, it is proposed that the distribution of the gecko *P. guianensis* encompasses the Amazon Basin, the Guiana Shield, and the



**Figura 3.** Mapa de distribución de *Pseudogonatodes guianensis*. La estrella verde indica el nuevo registro, el círculo amarillo indica la localidad tipo (aproximada, según se cita en la descripción original de Parker, 1935, en la parte alta del río Cuyuni, Guayana Británica), el círculo azul indica el registro interandino, y los círculos rojos representan registros basados en registros de museos obtenidos de GBIF.

**Figure 3.** Distribution map of *Pseudogonatodes guianensis*. The green star indicates the new record, the yellow circle indicates the type locality (approximate, as cited in the original description by Parker, 1935, in the Upper Cuyuni river, British Guiana), the blue circle indicates the inter-Andean record, and the red circles represent records based on museum records obtained from GBIF.

eastern foothills of the Andes in Colombia, a pattern similar to that observed in other small Amazonian squamates, such as *Potamites ecleopus* (Cope, 1875) and *Loxopholis parietalis* (Cope, 1886) (Diago-Toro et al. 2021).

The inter-Andean record in the Magdalena River valley in the Tolima department is intriguing (MPUJ-R634, Appendix 1.), although it could not be confirmed, so it may be a case of misidentification. Nevertheless, there is an increasing number of records for small ectotherms with a cis-Andean distribution in the inter-Andean valleys, as observed in the case of the glass frog *Cochranella resplendens* (Lynch & Duellman, 1973), the colubrid snake *Atractus occipitoalbus* (Jan, 1862), the lizard *Anolis fuscoauratus* (D'Orbigny, 1837) and the microteiid *Cercosaura*

*argulus* (Peters, 1862) (see Grisales-Martínez et al., 2017; Marín et al., 2017; Molina-Zuluaga et al., 2017; Diago-Toro et al., 2021).

Small cryptic geckos of the genus *Pseudogonatodes* can be misclassified due to their morphological similarity with other genus in the family Sphaerodactylidae (e.g., *Sphaerodactylus*), or due to the similarity among congeners. Therefore, the collection of individuals in the field and subsequent laboratory analysis is crucial for understanding the true distribution of the species, its intra-specific variation, and species boundaries. This is particularly important for *P. guianensis*, to assess whether the phenotypic divergence exhibited by Andean populations (as suggested by Avila-Pires, 1995 and Hoogmoed & Avila-Pires,

2000) may coincide with genetic divergence, thus positioning these populations as candidate species.

The species *P. guianensis* is listed as Least Concern (LC) according to Red List of the International Union of Conservation of Nature (IUCN), due to large distribution, lack of evidence for significant population decline, lack of widespread threats, and occurrence in numerous protected areas (Calderón et al., 2019). However, the true distribution and population trends at the Andean level are unknown, thus the record of the present study is relevant for a future evaluation.

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## APPENDIX 1 / APÉNDICE 1

Distribution records of *Pseudogonatodes guianensis* in Colombia, obtained from GBIF.

Registros de distribución de *Pseudogonatodes guianensis* en Colombia, obtenidos del GBIF.

Institutional abbreviations are as follows: MPUJ (Museo Pontificia Universidad Javeriana); MHUA (Museo de Herpetología de la Universidad de Antioquia); IAvH (Instituto de Investigación de Recursos Biológicos Alexander von Humboldt); ICN (Instituto de Ciencias Naturales - Universidad Nacional de Colombia); MHNU (Museo de Historia Natural de la Universidad de los Llanos); MCZ (Museum of Comparative Zoology - Harvard University); MLS (Museo de La Salle - Universidad de La Salle); USNM (Smithsonian National Museum of Natural History).

**COLOMBIA: Amazonas:** Leticia (4.182394° S, 69.942481° W): MPUJ-R633; (4.131235° S, 69.953887° W): MHUA-R13957; **Boyacá:**

Santa María (4.868284° N, 73.260612° W): IAvH-R8718; (4.755965° N, 73.310361° W): ICN-R8026; **Casanare:** Hato Corozal (5.908839° N, 71.477172° W): IAvH-AAO454, IAvH-AAO455, IAvH-AAO456, IAvH-AAO506; **Meta:** Mesetas (3.355000° N, 73.946389° W): ICN-R534, ICN-R535, ICN-R536; Villavicencio (4.118056° N, 73.464167° W): ICN-R541, ICN-R2396; (4.081081° N, 73.453276° W): MCZ-R154443; (3.676802° N, 74.316141° W): MCZ-R154756; (4.150277° N, 73.640000° W): MPUJ-R742; (4.141700° N, 73.625000° W): USNM-84970; (4.123861° N, 73.627092° W): MLS-25, MLS-593, MLS-594, MLS-595; (4.151667° N, 73.655556° W): MHNU-H360, MHNU-H36, MHNU-H470, MHNU-H471; **Putumayo:** Orito (0.433172° N, 77.085663° W): IAvH-R9228; **Tolima:** Ibagué (4.436389° N, 75.191667° W): MPUJ-R634; **Vaupés:** Taraira (1.1225° S, 69.523611° W): ICN-R8129, ICN-R8130, ICN-R8131, ICN-R8132, ICN-R8133, ICN-R8134, ICN-R8135, ICN-R-8136.