



New records of Cadena's Tailless Bat *Anoura cadenai* Mantilla-Meluk & Baker 2006 from Venezuela

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Resumen

Anoura cadenai se consideraba una especie endémica colombiana hasta su reciente reporte en Venezuela. A pesar de su morfología facial y craneal única, su superposición morfométrica con *A. caudifer* y *A. fistulata* ha propiciado identificaciones erróneas en colecciones y en campo. A partir de una revisión taxonómica se lograron identificar 20 nuevos especímenes y 3 nuevas localidades venezolanas. Estos registros se encuentran 158 km al oeste de los registros orientales y 358 km al este de los registros occidentales en Venezuela, representando una extensión significativa de la especie en nuevas unidades geográficas y ecológicas. Los nuevos registros verificados de *A. cadenai* sugieren su presencia en los bosques montanos de la Cordillera Oriental, la Serranía del Perijá y los bosques húmedos del Catatumbo.

Palabras clave: Andes, bosque montano, Catatumbo, Cordilleras, Depresión del Táchira, nectarívoro

Abstract

Anoura cadenai was considered a Colombian endemic species until its recent report from Venezuela. Despite being a species of *Anoura* with unique facial and cranial morphology, its morphometric overlap with *A. caudifer* and *A. fistulata* has favored misidentification in collections and the field. From a taxonomic revision, 20 new specimens and 3 new localities from Venezuela were identified. These records fall 158 km west of its eastern-most locations and 358 km east of its western-most records in Venezuela. A hypothesis of its presence in the Cordillera oriental forests, Serranía del Perijá and the Catatumbo moist forests is presented.

Key words: Andes, Catatumbo, Cordilleras, montane forest, nectarivore, Táchira Depression

Prior to its first report from Venezuela (Dybas da Natividade and da Cunha Tavares 2024), *Anoura cadenai* had been reported from 12 localities in Colombia (Mantilla-Meluk and Baker 2006; Calderón-Acevedo 2019; Morales-Martínez and Díaz 2020; Calderón-Acevedo et al. 2022; Calderón-Acevedo et al. 2023; García-Restrepo et al. 2023), and thought to be a Colombian endemic bat species (Ramírez-Chaves et al. 2020). *Anoura cadenai* can be easily confused with other *Anoura* species in the field and in museum collections. For example,

prior to Morales-Martínez and Díaz (2020) and Calderón-Acevedo et al. (2023) there was no known record of a live *A. cadenai* and the remarkable resemblance its soft tissue morphology has to *A. fistulata*. However, a combination of characters like its skull morphometrics, robust canines similar to those of *A. cultrata*, a flattened keel in the mesopterygoid fossa, a short posterior projection of the pterygoids that extends to the anterior projection of each bulla, and its elongated but blunt lower lip help diagnose this species (Mantilla-Meluk and Baker 2006; Calderón-Acevedo and Muchhala 2018; Calderón-Acevedo 2019; Calderón-Acevedo et al. 2021; Calderón-Acevedo et al. 2023).

Here I present a set of Venezuelan specimens from 2 localities reported by Dybas da Natividade and da Cunha Tavares (2024) and from 3 new localities (Figure 1), increasing the total number of known specimens of *A. cadenai* from 29 to 49 individuals and the number of localities from 15 to 18.

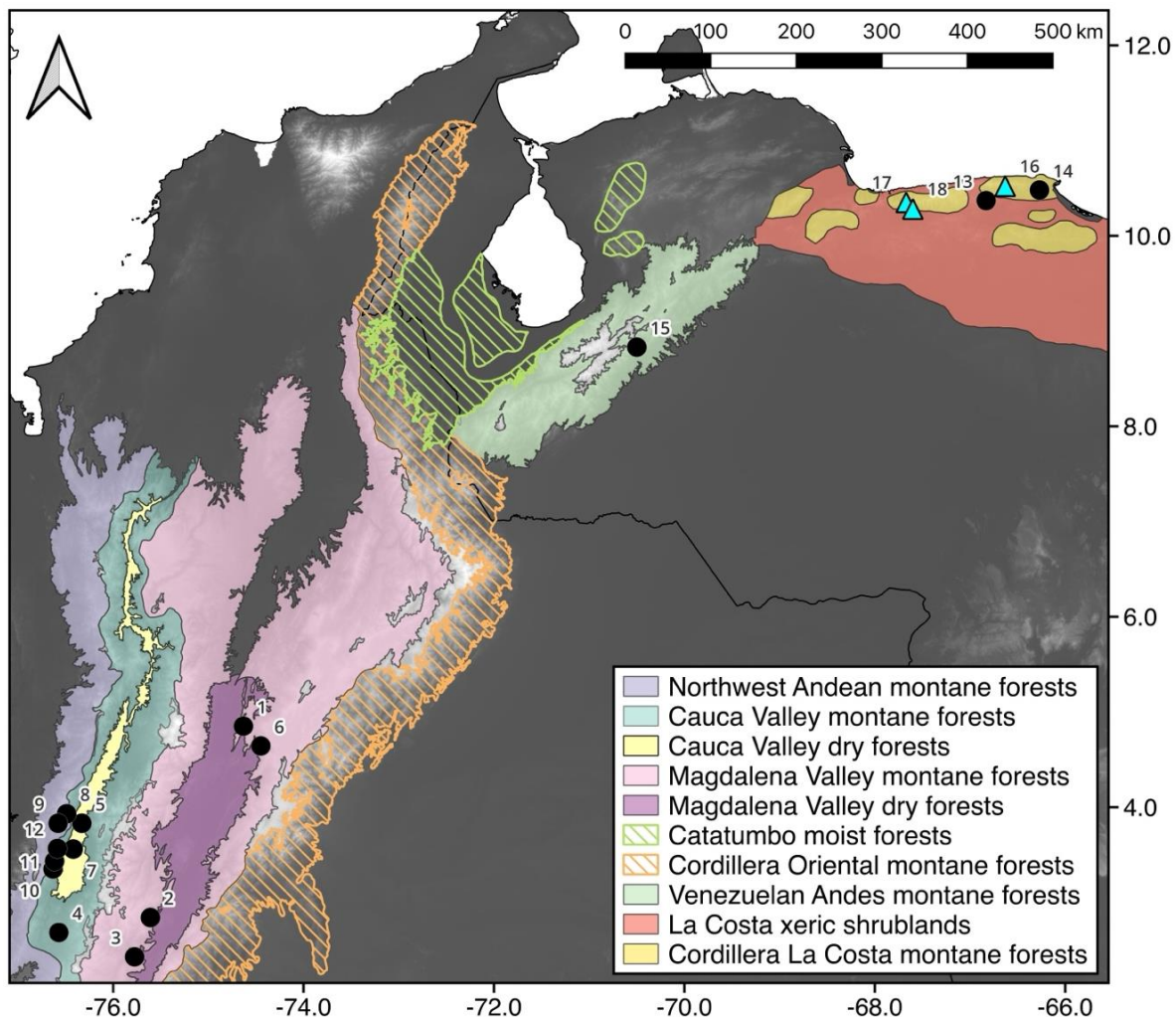


FIGURE 1. *Anoura cadenai* known records (black circles) and new localities (blue triangles).

I conducted a taxonomic revision of *Anoura* specimens housed at the National Museum of Natural History, Smithsonian Institution (USNM). I took standard morphometric measurements used to describe the morphology in the genus: greatest length of skull,

condyle-incisive length, zygomatic breadth, postorbital breadth, braincase breadth, mastoid breadth, maxillary tooth row, breadth across molars, breadth across canines and forearm (Supplementary Table 1) to the nearest 0.01 millimeter using a digital caliper as detailed in Calderón-Acevedo 2019. All revised specimens correspond to the specimens revised in: (Calderón-Acevedo and Muchhala 2018; Calderón-Acevedo 2019; Calderón-Acevedo and Muchhala 2020; Calderón-Acevedo et al. 2021; Calderón-Acevedo et al. 2022; Calderón-Acevedo et al. 2023).

Several specimens collected as part of the Smithsonian Venezuelan Project (Handley 1976) and diagnosed as *A. caudifer* stand out as robust *Anoura*, similar in size to the upper range of *A. caudifer*. All specimens can be diagnosed in accordance with previous comparisons and taxonomic revisions contrasting all *Anoura* species and including most of the known specimens of *A. cadenai*, and fill in the gaps to the west of previously known Venezuelan records (Figure 1) (Calderón-Acevedo and Muchhala 2018; Calderón-Acevedo 2019; Calderón-Acevedo and Muchhala 2020; Calderón-Acevedo et al. 2021; Calderón-Acevedo et al. 2022; Calderón-Acevedo et al. 2023). These specimens have the diagnostic characteristics of *A. cadenai* that differentiate them from other small-bodied *Anoura* species: the posteriorly flattened keel along the midline of the mesopterygoid fossa, posterior projection of the pterygoids short, extending to the anterior projection of each bulla, robust upper canines resembling *A. cultrata* and the sparsely haired uropatagium (Mantilla-Meluk and Baker 2006; Calderón-Acevedo et al. 2021). The lack a long, slender, fine-pointed lower lip protruding 4 mm, and a more robust skull with a less-developed mandibular symphysis clearly separates *A. cadenai* from *A. fistulata* (Calderón-Acevedo and Muchhala 2018; Calderón-Acevedo 2019). *A. cadenai* can be discriminated from the large-bodied *Anoura* species (*A. cultrata*, *A. geoffroyi*, and *A. latidens*) by the lack of a blade-like lower first premolar compared to *A. cultrata*, the lack of the median internal cusp of the last upper premolar separates it from *A. latidens* and a first lower molar lacking the antero-external cuspid and cristid, which is present in both *A. geoffroyi* and *A. latidens*. Additionally, their morphometric measurements are in accordance within range of the variation known to date for the species (Figure 2, Supplementary Table 1, <https://doi.org/10.17632/jv5f7vzwzp.1>).

TABLE 1. Updated localities of *Anoura cadenai*, * = Specimens from the type series, **= Specimens from this study. Coordinate precision and decimals are retained from the original publications. Collection Acronyms: National Museum of Natural History, Smithsonian Institution (USNM),

Locality	Catalog Number	Country	Department	Municipality	Longitude	Latitude
1	USNM 252016	Colombia	Cundinamarca	San Juan de Río seco	-74.633	4.85
2	ICN 21197	Colombia	Huila	Teruel	-75.61	2.84
3	ICN 17747	Colombia	Huila	Paicol	-75.776	2.428
4	AMNH 269477	Colombia	Cauca	Piendamó	-76.572	2.683
5	ICN 22806	Colombia	Valle del Cauca	Yotoco	-76.33	3.83
6	ANDES-M-2591	Colombia	Cundinamarca	La Mesa	-74.4502	4.6426
7	ICN 8892	Colombia	Valle del Cauca	Calima	-76.42	3.56
8	ICN 9152*	Colombia	Valle del Cauca	Calima	-76.49	3.93
8	ICN 8893*	Colombia	Valle del Cauca	Calima	-76.49	3.93
8	ICN 8894*	Colombia	Valle del Cauca	Calima	-76.49	3.93
8	ICN 9151*	Colombia	Valle del Cauca	Calima	-76.49	3.93

8	ICN 9153*	Colombia	Valle del Cauca	Calima	-76.49	3.93
8	ICN 9154*	Colombia	Valle del Cauca	Calima	-76.49	3.93
8	ICN 9155	Colombia	Valle del Cauca	Calima	-76.49	3.93
9	ICN 9156	Colombia	Valle del Cauca	Calima	-76.58	3.83
10	USNM 483366*	Colombia	Valle del Cauca	Cali	-76.633	3.35
10	USNM 483367*	Colombia	Valle del Cauca	Cali	-76.633	3.35
10	USNM 483368*	Colombia	Valle del Cauca	Cali	-76.633	3.35
10	USNM 483369*	Colombia	Valle del Cauca	Cali	-76.633	3.35
10	USNM 483370*	Colombia	Valle del Cauca	Cali	-76.633	3.35
11	USNM 483371*	Colombia	Valle del Cauca	Cali	-76.617	3.433
12	UV 14761	Colombia	Valle del Cauca	La Cumbre	-76.587	3.566
13	USNM 373704**	Venezuela	Miranda	San Andrés	-66.83	10.37
13	USNM 373705	Venezuela	Miranda	San Andrés	-66.83	10.37
13	USNM 373706	Venezuela	Miranda	San Andrés	-66.83	10.37
14	USNM 419431	Venezuela	Miranda	Birongo	-66.27	10.48
15	USNM 419445**	Venezuela	Barinas	Altamira, 7 Km NNE Altamira	-70.5	8.83
15	USNM 419455	Venezuela	Barinas	Altamira, 2 Km SW Altamira	-70.5	8.83
15	USNM 419457	Venezuela	Barinas	Altamira, 2 Km SW Altamira	-70.5	8.83
15	USNM 419458	Venezuela	Barinas	Altamira, 2 Km SW Altamira	-70.5	8.83
15	USNM 419460	Venezuela	Barinas	Altamira, 2 Km SW Altamira	-70.5	8.83
16	USNM 385903**	Venezuela	Miranda	Curupao, 5 Km NNW Guarenas	-66.63	10.52
16	USNM 385904**	Venezuela	Miranda	Curupao, 5 Km NNW Guarenas	-66.63	10.52
16	USNM 385905**	Venezuela	Miranda	Curupao, 5 Km NNW Guarenas	-66.63	10.52
16	USNM 385906**	Venezuela	Miranda	Curupao, 5 Km NNW Guarenas	-66.63	10.52
17	USNM 517411**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35
17	USNM 517412**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35
17	USNM 517413**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35
17	USNM 517416**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35
17	USNM 517417**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35

17	USNM 517424**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35
17	USNM 517425**	Venezuela	Aragua	Maracay, 13 Km NW, Rancho Grande Biological Station	-67.67	10.35
17	USNM 517415**	Venezuela	Aragua	Maracay, 14 Km NW, El Portachuelo	-67.67	10.35
17	USNM 517420**	Venezuela	Aragua	Maracay, 14 Km NW, El Portachuelo	-67.67	10.35
17	USNM 517421**	Venezuela	Aragua	Maracay, 14 Km NW, El Portachuelo	-67.67	10.35
17	USNM 517422**	Venezuela	Aragua	Maracay, 14 Km NW, El Portachuelo	-67.67	10.35
17	USNM 517426**	Venezuela	Aragua	Maracay, 14 Km NW, El Portachuelo	-67.67	10.35
17	USNM 517427**	Venezuela	Aragua	Maracay, 14 Km NW, El Portachuelo	-67.67	10.35
18	USNM 517418**	Venezuela	Aragua	Maracay, 4 Km NW, El Limon	-67.6	10.28

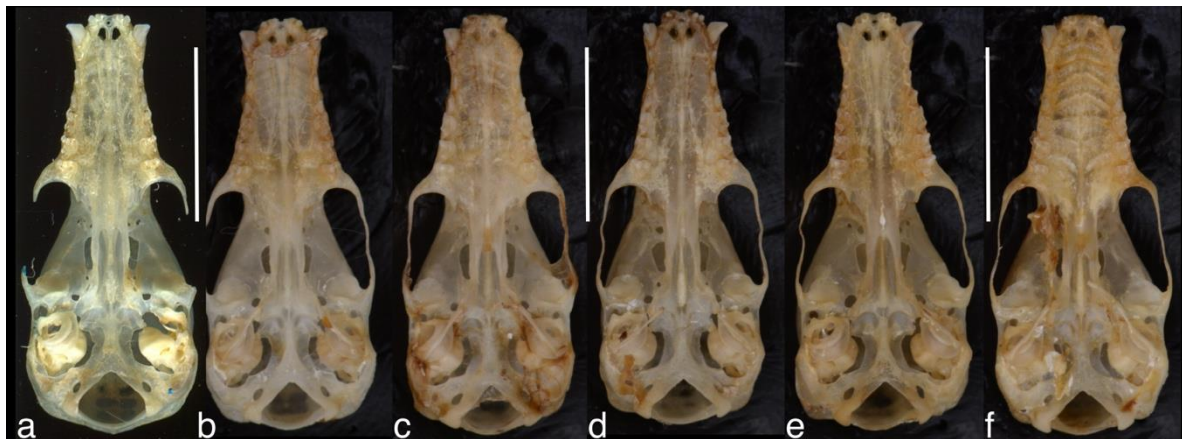


FIGURE 2. Comparison of part of the new *Anoura cadenai* records from Venezuela to the Type specimen, scale bar = 10 mm. a) Type specimen ICN 9152, b) USNM 373704, c) USNM 385903, d) USNM 385904, e) USNM 385905, f) USNM 385906. Note the robust skull morphology, canines and the characteristic flattened mesopterygoid fossa keel. All photos taken by Camilo A. Calderón-Acevedo.

Dybas da Natividade and da Cunha Tavares (2024) reported the localities of San Andrés and Birongo in the State of Miranda and Altamira in the State of Barinas (localities 13, 14, and 15 respectively; Figure 1, Table 1.). Specimens USNM 373704 and USNM 419445 are from San Andrés and Altamira. The other 18 specimens were collected in Curupao (5 Km NNW Guarenas) State of Miranda; and Maracay, 13 Km NW, Rancho Grande Biological Station and 14 Km NW, El Portachuelo (considered a single locality since the coordinates are identical,

locality 17) and Maracay, 4 Km NW of El Limon (locality 18) in the state of Aragua (Figure 1, Table 1). The records from Maracay help fill in the gaps of *A. cadenai*'s distribution in Venezuela and are 358 km east of Altamira and 158 km west of San Andrés.

In Colombia, *Anoura cadenai* had been reported from five ecoregions (as defined by Dinerstein et al. 2017) the Northwestern Andean montane forests, the Cauca Valley montane and dry forests and the Magdalena Valley montane and dry forests (Calderón-Acevedo et al. 2023). In Venezuela, it inhabits three ecoregions, the Venezuelan Andes montane forests, La Costa xeric shrublands and Cordillera de la Costa montane forests. The current distribution of *A. cadenai* across all Colombian Cordilleras and over the biogeographic barrier of the Táchira Depression suggest the distribution of this species across the Cordillera Oriental montane forest and the Catatumbo moist forests, potentially across the Serranía del Perijá, which could provide the necessary habitat to connect the eastern Andes of Colombia and Venezuela to the inter-Andean valleys and the Central and Western Cordilleras of Colombia. Other species of *Anoura* have had recent range extensions in the past two decades (Mantilla-Meluk and Baker 2008; Mantilla-Meluk et al. 2009; Gárate-Bernardo and Carrasco-Rueda 2011; Calderón-Acevedo and Muchhala 2018; Calderón-Acevedo 2019; Calderón-Acevedo and Muchhala 2020; Calderón-Acevedo et al. 2023) stemming from either taxonomic revisions, new specimens or previous misidentifications with *A. caudifer*; therefore it is possible that *A. cadenai* is far more common than currently understood.

The two most recently described species of *Anoura*, *A. cadenai* (Mantilla-Meluk and Baker 2006) itself and *A. javieri* (Pacheco et al. 2018) were collected six and three decades ago respectively, but only in the last 19 years they were recognized and described as independent species from *A. caudifer*. This pattern is common in other neotropical taxa, with special attention to the biodiversity hotspot the Cordillera Oriental has become (Morales-Martínez 2013; Morales-Martínez et al. 2016; Rodríguez-Posada et al. 2017; Morales-Martínez and López-Arévalo 2018; Rodríguez-Posada et al. 2018; Martínez-Medina et al. 2021; Morales-Martínez et al. 2021; Rodríguez-Posada et al. 2021; Martínez et al. 2023; Ramírez-Chaves et al. 2025) which highlights the importance of natural history collections and the efforts of taxonomists conducting regular revisions of Neotropical mammals.

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