

Updated geographic distribution and significant additional museum records for the Horned Frog, *Ceratophrys calcarata* Boulenger, 1890 (Anura: Ceratophryidae), in Venezuela

Distribución geográfica actualizada e importantes registros de museo adicionales para el sapo de cuernos, *Ceratophrys calcarata* Boulenger, 1890 (Anura: Ceratophryidae), en Venezuela

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ABSTRACT

The genus *Ceratophrys* is represented in Venezuela by two species: *C. cornuta* and *C. calcarata*. Despite being morphologically unique amphibians, most of the geographic distribution of *C. calcarata* in the north of the country has historically depended on bibliographic mentions and sightings without voucher specimens that allowed scientific verification. The present work formally reports first museum voucher specimens for the states of Mérida, Trujillo, Yaracuy and Zulia, and additional specimens that corroborate the presence of the species in Amazonas and Falcón states. Clarifications on unsupported historical records are included, and the importance of certain records is highlighted. These new data will bring up to date the geographic distribution map of the species within Venezuelan territory.

Keywords: Amphibia, Anura, Ceratophryidae, *Ceratophrys calcarata*, geographic distribution, Venezuela.

RESUMEN

El género *Ceratophrys* está representado en Venezuela por dos especies: *C. cornuta* y *C. calcarata*. A pesar de ser anfibios de morfología distintiva, la mayor parte de la distribución geográfica de *C. calcarata* en el norte del país ha dependido históricamente de menciones bibliográficas y avistamientos sin ejemplares testigo que permitan su verificación científica. En el presente trabajo se reporta formalmente primeros registros de ejemplares de museo para los estados Mérida, Trujillo, Yaracuy y Zulia, y ejemplares adicionales que corroboran la presencia de la especie en los estados Amazonas y Falcón. Se incluye aclaratorias sobre registros históricos dudosos y se destaca la importancia de algunos registros. Estos nuevos datos permiten actualizar el mapa de distribución geográfica de la especie en territorio venezolano.

Palabras clave: Amphibia, Anura, Ceratophryidae, *Ceratophrys calcarata*, distribución geográfica, Venezuela.

INTRODUCTION

The genus *Ceratophrys* Wied-Neuwied, 1824, comprises a group of robust anuran amphibians with a distinctive morphology, popularly known as “horned frogs”, “sapos de cachos” or “escuerzos”. Currently, eight species are recognized, distributed throughout the South American lowlands, covering Venezuela, Ecuador, Peru, Brazil, the Guianas, Bolivia, Paraguay, and Argentina (Faivovich *et al.* 2014, IUCN SSC Amphibian Specialist Group 2020, 2023, Frost 2026). In Venezuelan territory, the genus is represented by only two species: *Ceratophrys calcarata* Boulenger, 1890, and *Ceratophrys cornuta* (Linnaeus, 1758).

The oldest reference for the genus in Venezuela, as *Ceratophrys cornuta*, is that of Ernst (1877). Lutz (1927) indicated that *Ceratophrys* would be in this country but hesitated to assign it to *C. cornuta* or *C. calcarata*; however, Rivero (1961: 85) stated that “it might well have been an *Eleutherodactylus cornutus maussi* (= *Strabomantis biporcatus*)”. Röhl (1942, 1949, 1956, 1959) continued the use of the name *C. cornuta* without documenting specimens. Nonetheless, Röhl’s color descriptions and illustrations suggest that it most likely corresponds to *Ceratophrys calcarata*. None of these early records of *C. cornuta* for northern Venezuela have voucher specimens for verification and could be records of *C. calcarata*. In this regard, Rivero (1961) had already shown skepticism about the presence of *C. cornuta* in Venezuela and did not refer to any specimen for the country. The first sound record (although only photographic) for *C. cornuta* in Venezuela, used as a proof of its occurrence in this country, was finally issued by Rojas-Runjaic *et al.* (2021). Differences between *C. cornuta* and *C. calcarata* were provided by Cochran & Goin (1970); a necessary revision goes beyond the scope of this paper.

Ginés (1959: 110) was the first to give a precise locality for a *Ceratophrys* in Venezuela (“Río El Palmar”, in Zulia State), without identifying the species. We examined specimens from this locality (see below), and they correspond to *C. calcarata*. In that same work, Ginés mentioned that Dr. Juan Rivero had informed him of having collected specimens of *C. calcarata* “in the region of San Fernando de Apure” (undoubtedly a *lapsus* for San Fernando de Atabapo, as inferred from Rivero [1961: 84], who explicitly indicates that it was in San Fernando de Atabapo where he learned of a woman who had been bitten by a “sapo de cachos” (horned toad) in Puerto Ayacucho. This *lapsus* may be the source of Barrio-Amorós (1998) stating that the species was present in San Fernando de Apure, without documenting any specimens. To date, the presence of *C.*

calcarata (or any other *Ceratophrys*) in Apure State (and in fact, in all the Venezuelan Llanos) remains undocumented.

Rivero (1961) did not provide verifiable data (museum records) regarding the existence of *C. calcarata* in northern Venezuela, but for the first time documented it for Venezuelan territory with two specimens from what is currently Amazonas State. Based on the presence of *C. calcarata* there and in Santa Marta (Colombia), he extrapolated that the species’ distribution range likely included the Llanos and the Venezuelan Guayana, the Falcón region, and the lower Maracaibo Lake basin, northeastern Colombia, and probably the Guianas to the south and the savannas of northern Brazil.

All subsequent mentions of the species (*e. g.*, Rivero 1963, 1964, Gorham 1966, Lynch 1971, 1975, 1982, Müller 1973, Gorzula & Cerda 1979, Hoogmoed 1979, Péfaur & de Pascual 1982, Mercadal de Barrio 1986, La Marca 1992, Yústiz 1996, Barrio-Amorós 1998, 2004, Vázquez *et al.* 2011, IUCN 2020, Frost 2026) did not indicate museum records. The only verifiable museum records are those of Rivero (1961), La Marca (1986), and Schalk *et al.* (2014). It is imperative to document new localities of *C. calcarata* to understand its total distribution range. In this context, the primary objective of this article is to formally report the first museum voucher specimens for the states of Mérida, Trujillo, and Yaracuy, and additional specimens that corroborate the presence of the species in Amazonas Falcón and Zulia States. This is a comprehensive review of museum specimens in Venezuela; nonetheless we note that there might be some more samples in U.S. and European museums, as deduced from some lists available on the Internet.

NEW GEOGRAPHIC DISTRIBUTION RECORDS OF *CERATOPHRYS CALCARATA* FOR VENEZUELA

Amazonas State

CVULA (Colección de Vertebrados de la Universidad de Los Andes, Mérida) 7509, from “Puerto Ayacucho, Amazonas”, and MBUCV (Museo de Biología, Universidad Central de Venezuela) 886, from “Territorio Amazonas, Amazonas”. These records are important because they corroborate the presence of *C. calcarata* in Amazonas State, a controversial disjunct population. Records assigned to this state in previous works include UPR-M 196 from “Territorio Amazonas” and UPR-M 197 from “Pto. Ayacucho” (Rivero 1961), which were alternatively considered as doubtful specimens of *C. cornuta* (Barrio-Amorós, 1998) or a disjunct population of *C. calcarata* (Barrio-Amorós *et al.* 2019). A more recent record (KU

-University of Kansas- 207528) was provided by Schalk *et al.* (2014), also for Puerto Ayacucho.

A picture of a single live animal in Barrio-Amorós *et al.* (2019), although without a museum number, is also from “Puerto Ayacucho, Amazonas”. Another unvouchered record for the species in Barrio-Amorós (1998) deserves a comment: “Puerto Ayacucho, Agualinda” probably refers to a sector of the same name northeast of Puerto Ayacucho city, while the record from “San Fernando de Atabapo” is erroneous and most likely a misinterpretation of a comment in Rivero (1961). In that work, the later author mentioned that in said locality he heard a report of a “sapo de cachos” (“horned toad” in English, most likely a *Ceratophrys*) from Puerto Ayacucho and explicitly noted that the animal “is not known by the people of San Fernando de Atabapo” (Rivero 1961: 85).

Falcón State

There is only one documented museum record for a locality in the state of Falcón, from the locality of Sanare (EBRG -Estación Biológica de Rancho Grande, Mara-

cay- 1407, 1516), provided by Mijares-Urrutia & Arends (1993). Here, we present the second museum record, represented by specimen UMMZ (University of Michigan Museum of Zoology) 2026, coming from “5 km by road S of El Vínculo, Paraguaná Peninsula, Falcón State” (Fig. 1C). Other *Ceratophrys calcarata* from the Paraguaná Peninsula, for which only photographs are available, are shown for the first time in Fig. 1(A, B, D) as examples of the chromatic variability exhibited by the species in the region. In addition to the locality of “Moruy, Paraguaná Peninsula, Falcón municipality” (in Mijares & Arends 2000), also without voucher specimens, the individuals illustrated here would be among the first documented records (albeit only through photos) for the Paraguaná Peninsula.

Mérida State

CVULA 0131, from “El Vigía, near Guayabones, 22 km NE of El Vigía, Mérida State, Venezuela”. This constitutes the first record for the state and the southernmost locality north of the Orinoco River; the presence of the

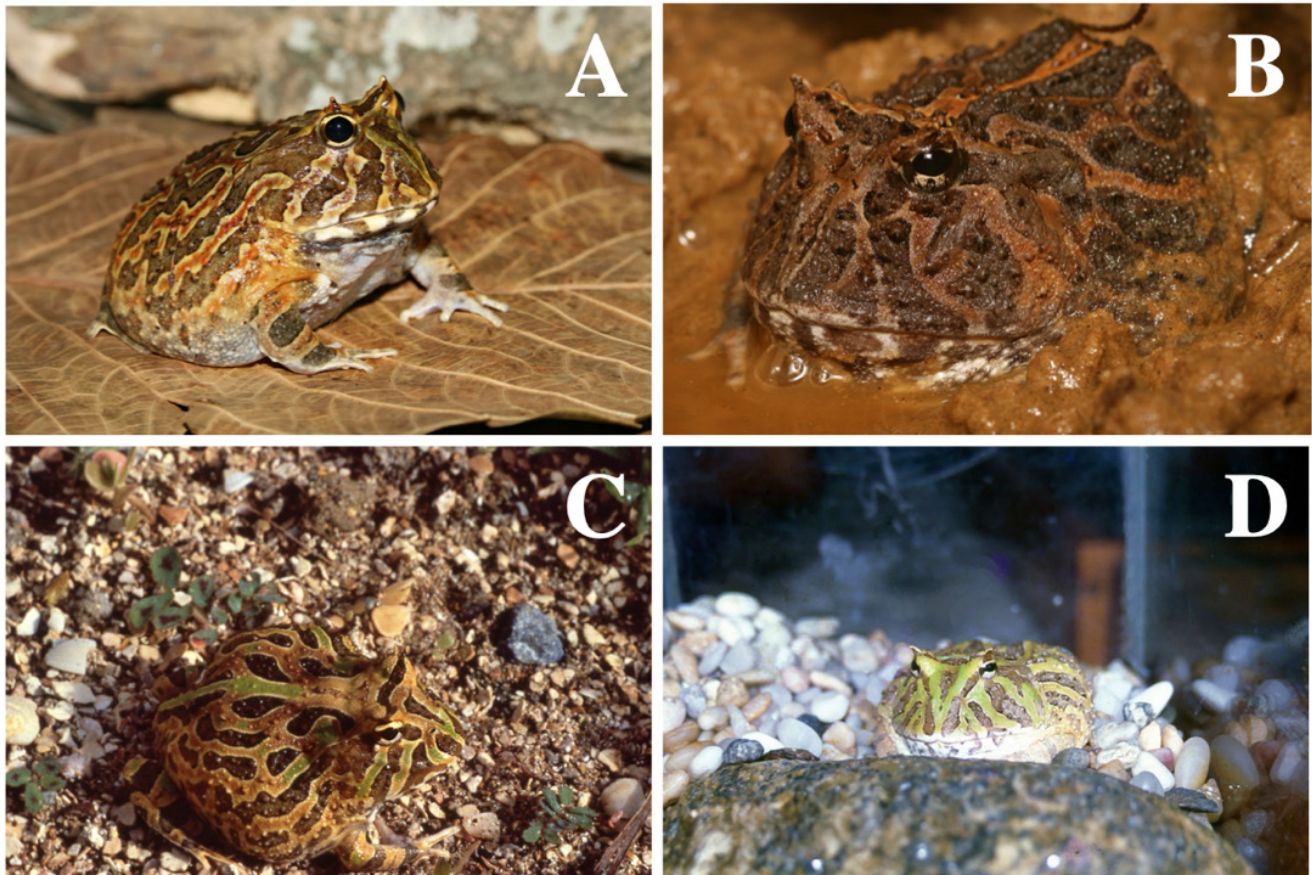


Figure 1. *Ceratophrys calcarata* specimens from Falcon state, Venezuela. (A, B) “Paraguaná”, (C) “Paraguaná, 5 km S El Vínculo”, (D) “Yaracal, municipio Cacique Manaure”. Photos: A, B (Luis Merlo), C (Allan Markezich), D (Luis Fernando Navarrete and Karel Lemoine). Specimens not collected.

species in nearby Colombia (Acosta Galvis 2023) at similar latitudes and in equivalent ecosystems suggests that the species could also be present on the lowlands close to the Andean-lacustrine slopes of Táchira State.

Trujillo State

ULABG (Colección de anfibios y reptiles, Laboratorio de Biogeografía, Universidad de Los Andes, Mérida) 7856-7857, from an artificial lake on a farm “18 km W Sabana de Mendoza, municipio Sucre, estado Trujillo, Venezuela” (Fig. 2), geographic coordinates (WGS84) 9°25'47.73" N, 70°56'26.00" W. It represents the first record for Trujillo State.

Yaracuy State

ULABG 7845, captured in “Aroa, SW San Felipe, 10°27.304" N, 68°54.169" W, 200 m s.n.m., estado Yaracuy, Venezuela”. It represents the first record for Yaracuy State. In the same locality, another specimen was observed but not captured, buried on the grounds of a pastureland. It exhibited a lime-green coloration on the flanks and a contrasting dark brown pattern on the back, somewhat tiger-striped. Neither of these specimens was photographed alive, and for ULABG 7845, only the dry skull is preserved.

Examination of the skull (Fig. 3) reveals that it belongs to the family Ceratophryidae, genus *Ceratophryns*, as confirmed by the presence of non-pedicellate teeth on maxilla and premaxilla and the architecture of the bony shield (cf. Lynch 1982, Wild 1997). This identification is further supported by the robustness and hyper-ossification of the cranium, the presence of a massive postorbital arch, and the dorsal orientation of the orbits –traits that clearly distinguish it from the sympatric bufonids described by Mendoza (2011). Given its geographical origin, the specimen is specifically assigned to *Ceratophryns calcarata*, as it is the only species of the genus identified to date in Venezuela north of the Orinoco River.

Zulia State

MBUCV 508, from “El Laberinto, Río Palmar, Zulia”; MBUCV 540, 6655-6663, from “Maracaibo, Zulia”; MBLUZ (Museo de Biología de la Universidad del Zulia, Maracaibo, Venezuela) 34, from “carretera vía Tulé, edo. Zulia”; MBLUZ 36, from “Canchancha I, norte de Maracaibo, edo. Zulia, Venezuela”; MBLUZ 80, from “El Moján, edo. Zulia”; and MBLUZ 209, from “Agropecuaria San Sebastián, municipio Machiques de Perijá, 9°52'3.50" N, 72°23'58.80" O, 100 m s.n.m.”; represent new intra-state records.



Figure 2. *Ceratophryns calcarata* live adult (top), not collected, and its habitat (bottom) at an artificial lake in Sabana de Mendoza, Trujillo state, Venezuela. Photos: Santos Bazó.

The first museum record for *Ceratophryns calcarata* in Zulia State consisted of the tadpoles (KU -University of Kansas- 193492, 193498-193499) from ‘NW Maracaibo’ reported by La Marca (1986). This locality can now be more accurately defined thanks to a post-metamorphic specimen (ULABG 425), captured alongside these tadpoles by the same collectors at a “pond NW of Maracaibo, road near Don Bosco, Zulia State”. Infante-Rivero (2009) provided the second museum record (MBLUZ 105) giving “Cojoro” as the place of collection, which, according to catalog data should specifically be “La Guajira a 10 km de Cojoro, municipio Páez, estado Zulia”. The closest *Ceratophryns calcarata* populations to this Venezuelan Guajira record are those from the Peninsula of La Guajira in Colombia (Acosta Galvis 2023, and Fig. 4 herein). Infante-Rivero and Velozo (2015: 143) listed *Ceratophryns calcarata*, without indicating voucher specimens, from a locality



Figure 3. Dorsal (top) and ventral (bottom) views of cranium of *Ceratophrys calcarata*, museum specimen ULABG 7845, from Aroa, Falcon state. Photos: Oscar Mendoza.



Figure 4. Individuals (not collected) of *Ceratophrys calcarata* from Peninsula de La Guajira in Colombia. Photos: Ricardo Pineda.

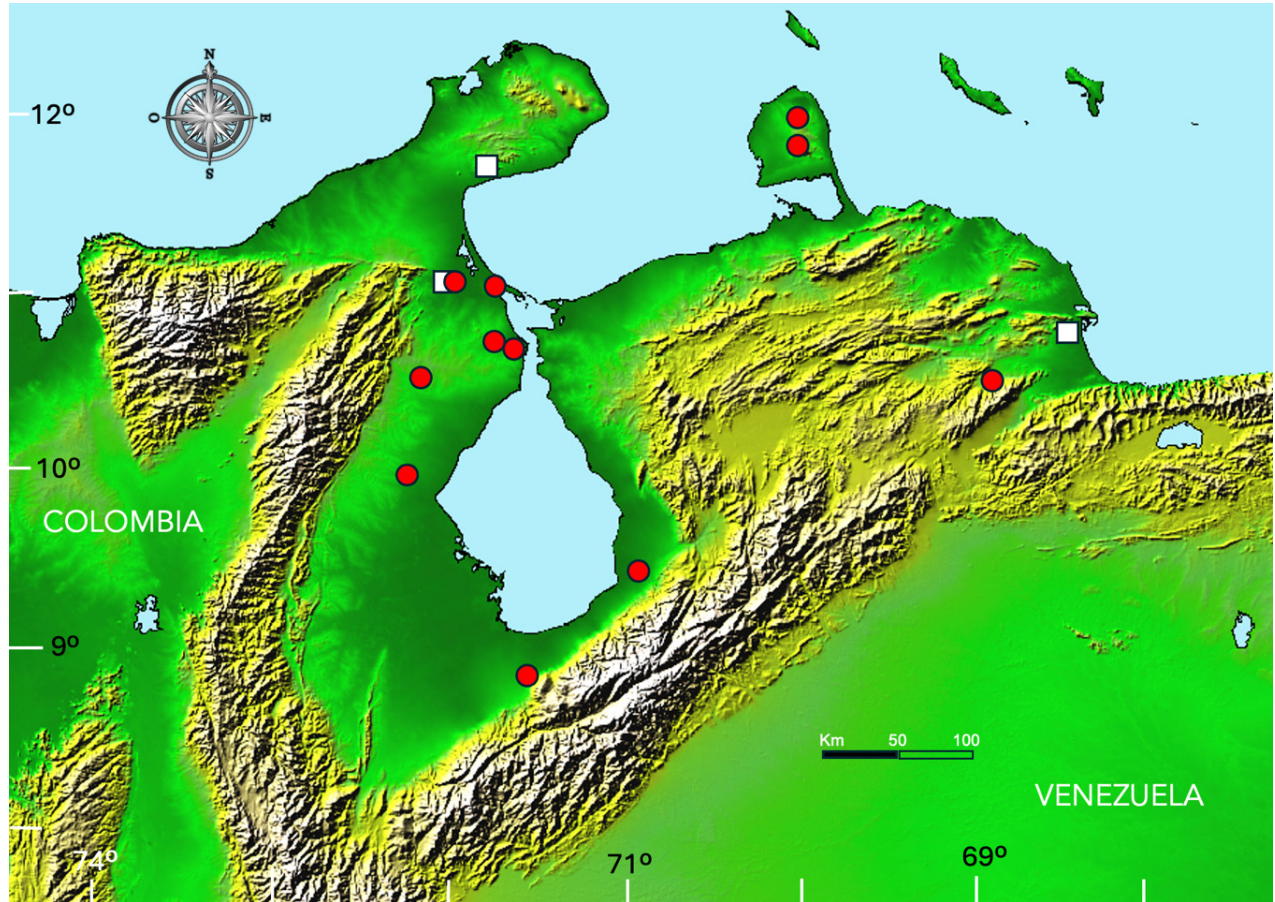


Figure 5. Locality records of *Ceratophrys calcarata* north of the Orinoco River. Venezuelan records south of the Orinoco River (not shown on map) are restricted to Puerto Ayacucho city and vicinities. White squares represent literature records. Red circles are new records presented in text.

near Machiques de Perijá; one of them most probably correspond to MBLUZ 209.

For the first time we have a more precise view of the geographic distribution of *Ceratophrys calcarata* in Venezuela, north of the Orinoco River (Fig. 5). More studies are needed to obtain a more complete picture. Records south of the Orinoco River (not shown in Fig. 5, but see map 42 in La Marca 1992: 101) are still limited to the city of Puerto Ayacucho and vicinities, in the Venezuelan Amazonas State.

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the study of the *Ceratophrys* specimens deposited in those collections. Gilson Rivas and Tito Barros provided info on relevant Zulia records and museum specimens deposited in MBLUZ. Gilson Rivas kindly brought to our attention two pertinent papers citing Zulia records that we were previously unaware of. We thank Alan Markezich and Ricardo Javier Pineda Camargo for kindly providing photographs of live *Ceratophrys calcarata* specimens used in Fig. 1C and Fig. 4, respectively. Oscar Mendoza kindly provided photographs of the skull of *Ceratophrys calcarata* depicted in Fig. 3. The manuscript benefited from the comments of two anonymous reviewers, to which we are most thankful.

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