

## Distribution update

### New record of crab-eating fox in southwestern Colombia, with comments on its distribution in Colombia and Ecuador

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## Abstract

We present the southernmost Andean record of the crab-eating fox *Cerdocyon thous* from the Patía river basin in the Department of Nariño, Colombia. The specimen was found road-killed on the Pan-American Highway. The locality is near the border with Ecuador, where the species has been recorded on a few occasions; however, those records had been considered dubious. We suggest the likely presence of *C. thous* in Ecuador based on historical mentions in the literature. We discuss crab-eating fox records from different regions of Colombia that had previously been ignored.

## Introduction

The crab-eating fox *Cerdocyon thous* is considered a common species along its distribution (Berta 1982, Wozencraft 2005) and is listed as Least Concern (Courtenay and Maffei 2008). The species inhabits the savannah and woodland areas of northeastern South America (Berta 1982), and the Darién region of Panama (Tejera et al. 1999). It has been recorded in north Argentina, Bolivia, Brazil (except Amazonia), Colombia, Ecuador, French Guyana, Guyana, Suriname, Panama, Paraguay, Uruguay and Venezuela (Medel and Jaksic 1988, Tejera et al. 1999, Wozencraft 2005, Courtenay and Maffei 2008, Tirira 2009).

In Colombia it is probably the most common of five fox species (Hershkovitz 1957, Solari et al. 2013) and it is present in a diversity of ecosystems including the outskirts of large towns, on farmlands, pastures and drier open woodlands (Hershkovitz 1957, Alberico et al. 2000). Although the species is widely distributed in all natural regions of the country (Solari et al. 2013), in their distribution account Courtenay and Maffei (2008) excluded the biogeographic Chocó, the Amazonas, most of the Orinoco region, the Central and most of Eastern Cordillera, and the inter-Andean valley of Magdalena River. Of these areas, only the Amazonas lacks records (Eisenberg 1989). In the Orinoco region the species is common and widely known (Martínez and Cadena 2000). The Eastern Cordillera and Magdalena Valley present several records in collections and literature (Cuervo-Díaz et al. 1986), including the holotype of *C. thous germanus* with type locality in the “Savanna of

Bogotá” (Allen 1923), and *C. apollinaris* (synonym of *C. t. aquilus* according to Berta 1982, and Wozencraft 2005) which type locality is “Chochí, eastern slope of cordillera, Bogotá” (Thomas 1918). For the Biogeographic Chocó, a few records are known in the localities of the Micay River in Department of Cauca (Eisenberg 1989), Buenaventura in Department of Valle del Cauca, and Riosucio, Parque Nacional Natural Katíos in the Department of Chocó, (Cuervo-Díaz et al. 1986, Muñoz-Saba and Alberico 2004).

Two subspecies of *C. thous* are present in Colombia: *C. thous aquilus* (Bangs, 1898), type locality Santa Marta, in the Caribbean region, and *C. thous germanus* G. M. Allen, 1923 (Berta 1982, Wozencraft 2005). Recently, Machado and Hingst-Zaher (2009) suggested, based on patterns of skull shape variation, that the specimens from the Llanos (Orinoco region) and tropical and subtropical lowland forests of Colombia and Venezuela, including the Andes and inter-Andean valleys, belong to a distinct and fairly uniform geographic group. The oldest available name for this group is *C. thous aquilus*.

In Ecuador, only a few mentions of the species in the literature are available. Allen (1916) listed a skull (skin mislaid) obtained in Quito as *C. thous*. Tate (1931) obtained specimens of “*Urocyon*” from the southern region of the country from H.E. Anthony. However, Hershkovitz (1957) considered the specimens belonged to *C. thous*, based on information given to him by George G. Goodwin. Orcés (1947) mentioned the species in tropical and subtropical forest in Manta, Ecuador, but no voucher

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specimens were included. Recently Tirira (2009) registered a skin collected in Imbabura, Ibarra (00°21'N, 78°07'W, 2,630m), but considered the locality of the record in Ecuador as questionable, given the ecological characteristics of this area, although no more details were provided. Courtenay and Maffei (2008) excluded Ecuador in the distribution of crab-eating fox.

Here we present the southernmost record of *C. thous* in the Andean region of Colombia. We suggest the likely presence of *C. thous* in Ecuador, based on historical records and the short distance between our new record and the border with Ecuador. Finally, we clarify the distribution of the species in biogeographic Chocó, Orinoco and Andes regions of Colombia.

## Methods

We present a new record of *C. thous* from Colombia based on a road-killed specimen. In addition, we discuss additional records from Colombia and Ecuador from a review of extensive literature and museum collections that had not previously been considered. Specimens mentioned in the text are deposited in the collections of the Museo de Historia Natural de la Universidad del Cauca (MHNUC), Popayán, the Instituto de Ciencias Naturales, Universidad Nacional de Colombia (ICN), Bogotá, the Instituto de Investigaciones Biológicas, Alexander von Humboldt (IAvH), Villa de Leyva, Colombia, and the Zoologische Staatssammlung München (ZSM), Germany.

## Results

On 1 September 2008, a road-killed adult male crab-eating fox was found on the Pan-American Highway in the Corregimiento El Tablón Panamericano, km 71 of Pasto-Mojarras Road (01°34'N 77°21'W, 1,186 m), between El Tablón and El Manzano localities, Municipality of Taminango, Department of Nariño, Southwestern Colombia. This region is located between the Western and Central Cordilleras of the Andean region, in the upper Patía River basin. The natural vegetation is highly disturbed by agricultural activities, livestock and burning; in the valley of the Patía River, the dominant vegetation is herbaceous (Ramírez-Padilla and Macías-Pinto 2009). Average annual temperature is 25°C; average relative humidity is 79%, and annual average precipitation is 809mm distributed in a bimodal-tetra-seasonal pattern (Sánchez et al. 2007).

The skin of the specimen was recovered and deposited in the MHNUC, with catalogue number MHNUC 1958. In addition, we recovered the baculum (Figure 1), 52mm in length, with a deep urethral groove extending from near the base to near the distal end of the bone, resembling the shape of other canid species.

MHNUC 1958 was found 93km from the border with Ecuador (Figure 2). We also found a skull of a young specimen at the ZSM collection (ZSM 1949/1155), previously identified as *Canis azarae* (synonym of *C. thous*). Unfortunately, the posterior part of the cranium was broken (occipital condyles broken and not preserved) and other than the locality (Chimborazo) no additional information was available. Chimborazo province is located in the central Andes of Ecuador. ZSM 1949/1155 was a juvenile (with second upper molar not erupted) and presented size and morphology characteristics that match other juvenile specimens of crab-eating fox housed at the same collection.

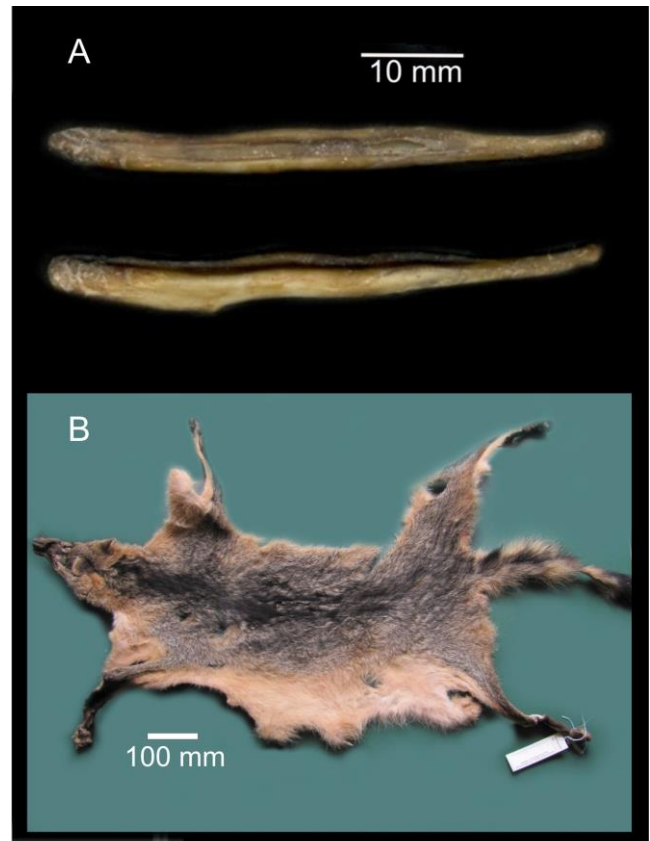


Figure 1. The baculum (A) and skin (B) of crab-eating fox specimen (MHNUC 1959) from Corregimiento El Tablón Panamericano, km 71 Road Pasto-Mojarras, Taminango, Nariño, Colombia.

## Discussion

Previous crab-eating fox records in the south Andes of Colombia by Alberico and Negret (1992) included a single observation in January 1990 near the Pan-American Highway La Lupa, between El Bordo and Patía (02°05'N 76°59'W, 810m), and one road-kill in El Estrecho (2°07' N, 77°05' W, 700m), in December 1990. Both localities are located north of MHNUC 1958, but in similar habitat. Although no additional evidence of the presence of the species was provided by the authors, we reviewed one specimen deposited in the ICN collections (ICN 9918) from El Bordo (2°06' N, 76°59' W, 1,000m *a.s.l.*), Department of Cauca, Patía River basin.

Given the proximity of the MHNUC 1958's locality to the border with Ecuador, we speculate that the presence of *C. thous* in areas mentioned by Allen (1916), Orcés (1947), Tate (1931), Hershkovitz (1957) and Tirira (2009) is likely, as there are no readily apparent geographical barriers. Besides several mentions of *C. thous* in Ecuador, until now only Ibarra (Tirira 2009), and Chimborazo (ZSM 1949/1155) are supported by voucher specimens. The collections made by Anthony in Ecuador on which Tate (1931) based his records of *Urocyon* (belonging to *C. thous* sensu Hershkovitz 1957) are in theory deposited in the AMNH collections. However, after extensive searches of the AMNH collections, it was not possible to locate them (M. Pinto, pers. comm.). Based on distribution, both MHNUC 1958 and the Ecuador specimens belong to *C. thous aquilus* (Bangs, 1898). However, a new systematic analysis of the subspecific status of *Cerdocyon* in both countries is needed, considering that two subspecies have been historically identified in Colombia. It will be useful to corroborate the current presence of crab-eating fox in

Ecuador as well, considering that it is only known from historical records there.

For Colombia, only the Amazonas region lacks voucher specimens, although there are several records from the Serranía de La Macarena (ICN 745, ICN 768-769, ICN 15382, ICN 16149; Suárez-Castro and Ramírez-Chaves 2015), located in a transitional area between Amazonas and Orinoco regions. The species is well known in the Andean, Orinoco, and Caribbean regions, as shown by abundant references and records from several localities (e.g. Bangs 1898, Allen 1923, Thomas 1918, Cuervo-Díaz et al. 1986, Martínez and Cadena 2000, Suárez-Castro and Ramírez-Chaves 2). The biogeographic Chocó of Colombia is perhaps the region with the lowest number of records and specimens known (Eisenberg 1989, Cuervo-Díaz et al. 1986, Muñoz-Saba and Alberico 2004). The record from Ríosucio is based on one skull (IAvH 3950) that supports the species' presence in the biogeographic Chocó of Colombia. This locality is geographically closer to Panama, and contributes to explain the hypothesis of colonization proposed by Tejera et al. (1999), considering that crab-eating foxes have been increasing their distributional range due to their adaptability to disturbed areas (Cuervo-Díaz et al. 1986). New range extensions or confirmation of distribution have been recently published for Venezuela (Hadik-Barkoczy 2013) and Brazil (de Thoisy et al. 2013). New records from forested areas under settlement pressure are expected in Colombia.

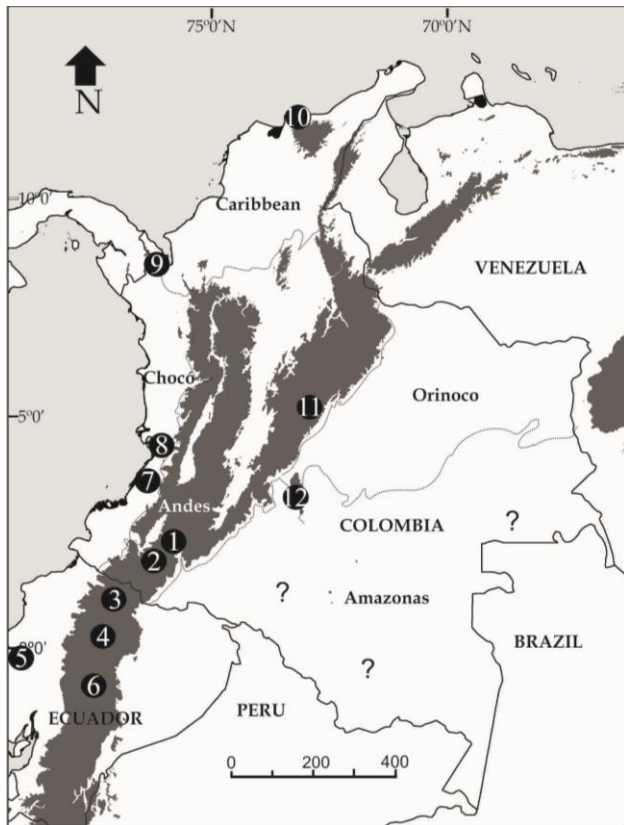


Figure 2. Localities of crab-eating fox *Cerdocyon thous* records in Southwestern Colombia, and Ecuador included in the text.

1. El Bordo; 2. El Tablón Panamericano (Colombia); 3. Imbabura, Ibarra; 4. Chimborazo; 5. Manta; 6. Quito (Ecuador). Additional localities from Colombia are: 7. Micay, Cauca; 8. Buenaventura, Valle del Cauca; 9. Ríosucio, Chocó; 10. Santa Marta, Magdalena; 11. Choachí, Cundinamarca; 12. Serranía de La Macarena, Meta. The species is also widespread and common in the Orinoco region of Colombia. Question marks denote areas with no records for the species.

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