

**First record of *Diphylla ecaudata* Spix, 1823 (Phyllostomidae, Desmodontinae) for the state of Amazonas, and update on species distribution in Brazil**

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**Abstract.** This note records the first capture of *Diphylla ecaudata* in the state of Amazonas. This is the first record for the central Amazon, filling a gap in its distribution, as well as confirming another of Brazilian state with the presence of the species.

**Keywords:** Hairy-legged Vampire Bat, central Amazon, Geographical distribution.

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*Diphylla ecaudata* Spix, 1823 is the smallest of the three species of vampire bat and also shows the most sparse distribution (Greenhall et al. 1984; Know & Gardner 2008). It is found in its northernmost distribution in the southern United States (Reddell 1968), occurring also in Mexico, Belize, Guatemala and Panama in Central America (Dalquest & Hall 1947; Hall & Kelson 1959; Jones 1966; Greenhall et al. 1984; McCarthy 1987). In South America it has been recorded in Colombia, Venezuela, Ecuador, Peru, Bolivia, and Brazil (Spix 1823; Allen 1900; Sanborn 1949; Ojasti & Linares 1971; Siles et al. 2003; Aguirre 2010).

In Brazil, *D. ecaudata* has been found in 19 states and in the Federal District (Figure 1) (Spix 1823; Thomas 1900; Pira 1904; Ruschi 1951; Piccinini 1974; Mares et al. 1981; Mok et al. 1982; Peracchi et al. 1984; Uieda 1986; 1992; Bredt et al. 1999; Nogueira et al. 1999; Pinto-da-Rocha 1995; Pinto-da-Rocha et al. 2001; Gregorin et al. 2008; Leek et al. 2011; Feijó & Langguth 2011; Leal et al. 2013; Almeida 2014; Rocha et al. 2014), with more than one record in at least 13 of these Federative Units (Table 1). In the central Amazon basin and part of the southwestern region of South America there are no records for the species, which may be related to a sampling gap or to disjunct distribution (Know & Gardner 2008; Rocha et al. 2014). Herein, we report the first capture of a *D. ecaudata* in the state of Amazonas, providing support to the former hypothesis.

The specimen here reported was captured during a bat survey conducted in the Extractive Reserve Auati-Paraná, state of Amazonas. This specimen, a lactating female (Figure 2), was captured on May 15, 2015, at 9 pm, on a ground-level mist net set in an open area near a pigsty in

the edge of a terra firme secondary forest (2°01'07.8"S, 66°19'10.0"W), on the shores of Lake Inambé and identified according to Allen (1896), Miller (1907) and Greenhall et al. (1984).

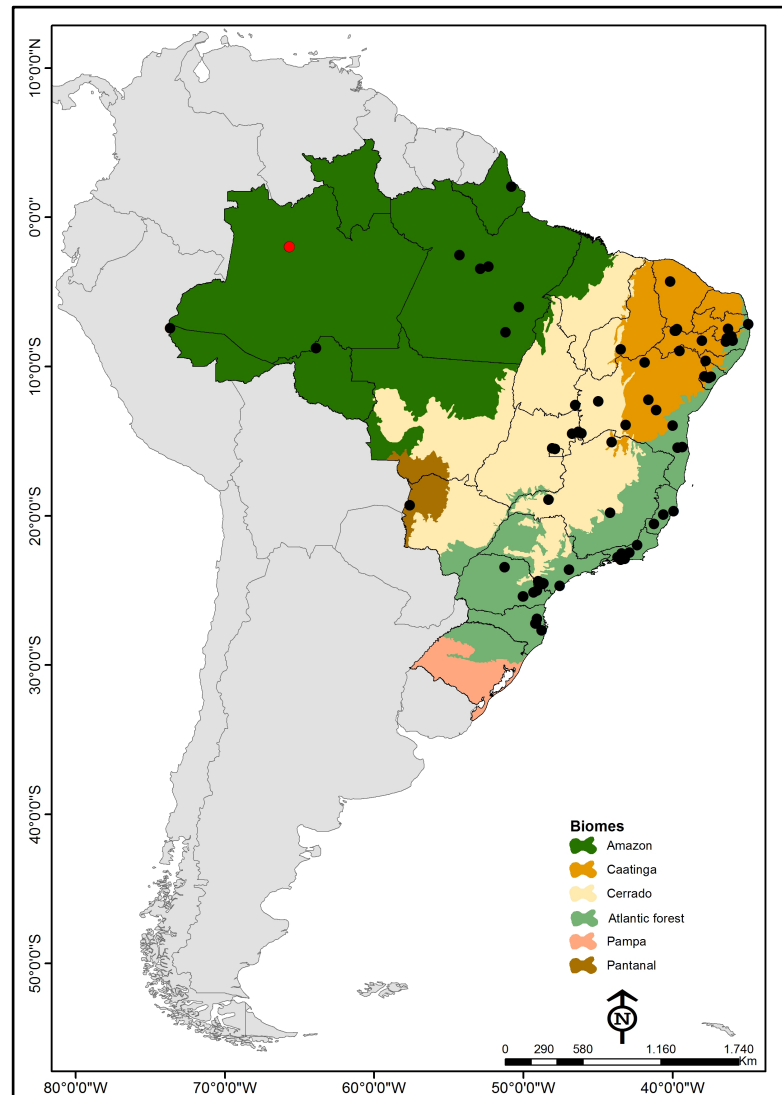
Our samplings and collections were conducted under the license 42111-2 (Chico Mendes Institute for Biodiversity Conservation), and the *D. ecaudata* was prepared as a fluid-preserved specimen and deposited in the Collection of Mammals in the Collection of Biological Material at the Institute of Sustainable Development Mamirauá (IDSM01073). All procedures were in accordance with the guidelines of the American Society of Mammalogy (Sikes et al. 2011).

*Diphylla ecaudata* is a medium-sized bat, with body length between 65 and 87 mm, forearm ranging from 50 to 56 mm, total body weight between 24 and 43 g (Kwon & Gardner 2008). It has big eyes and small round ears. The coat is dense, with fur on the forearm, legs, and uropatagium. The coloring of the coat varies from light to dark brown on the dorsal region and is paler in the ventral region. Hind limbs and calcaneus are short, and there are no calluses on the thumbs (Greenhall et al. 1984; Koopman 1988; Kwon & Gardner 2008). The skull differs from those of *Desmodus* and *Diaemus* by having a larger and wider post-orbital constriction, and also by the presence of two mandibular molars (Miller 1907; Ruschi 1951; Kwon & Gardner 2008). The lower incisors are arranged in a semicircular fashion and are bigger than in other Desmodontinae. There are also four lobes in the inner and seven lobes in the outer incisors (Miller 1907; Ruschi 1951; Greenhall et al. 1984; Koopman 1988). The dental formula is 2/2, 1/1, 1/2, 2/2 × 2 = 26. The specimen presented the following measurements: total body length - 72.48 mm; forearm length - 54.61 mm; and weigh 31 g.

All these measurements are in accordance to data provided by Kwon & Gardner (2008).

This is the first record of *D. ecaudata* for the state of Amazonas, which is now known to harbour the three vampire bat species (Bernard et al. 2011). The nearest locality where this species was recorded in the Brazilian Amazon – Porto Velho, in Rondônia- is more than 800 km away from our study site. Our record, therefore, contributes to fill a large gap in the distribution of *D. ecaudata*, providing evidence against the hypothesis of a potentially disjunct distribution for this species (Know & Gardner 2008; Rocha et al. 2014). Although there are long-term studies in the state of Amazonas, such as the Biological Dynamics of Forest Fragments of the National Institute for Research in the Amazon, which for over 20 years is sampling bats (Sampaio et al. 2003), *D. ecaudata* was never captured. This can be explained because the species is most commonly found in natural shelters such as caves and crevices, as these locations may have the ideal conditions of humidity and temperature tolerated by the species (Greenhall et al 1984; Altringham, 1996). So, perhaps explains their relative scarcity capture in inventories in forests (Scheffer et al. 2011). We emphasize that the specimen was only caught probably because the mist net was placed near the pig pen.

To date, the Pampa is the only biome with no records for this species in Brazil (Paglia et al. 2012). The protected area in which *D. ecaudata* was collected is included in the Central Amazon Corridor, which is a relevant area for the conservation of Amazonian biodiversity. Although showing a great biodiversity, it has been subject to few wildlife surveys (Ayres et al. 2005). This record shows that our basic understanding of the distribution of bats in the Amazon basin is still poor, with only a few sites with intense surveys and many areas without any inventory (Bernard et al. 2011a, b). With this record, the state of



**Figure 1.** Records of *Diphyllo ecaudata* in Brazil. The red circle represents the new locality assigned in the Extractive Reserve Auati-Paraná, state of Amazonas and black circles indicate the records from other states.

Amazonas now has 112 species of bats (Bernard et al 2011a; Santos et al 2015).

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**Figure 2.** Specimen of *Diphylla ecaudata* collected in the in the Extractive Reserve Auati-Paraná, state of Amazonas. Ventral (A), dorsal (B) and facial (C) views.

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Table 1. Records of *Diphylla ecaudata* in Brazil. Asterisks indicate the first record for each state.

Locality	State	Latitude	Longitude	Author
Parque Nacional da Serra do Divisor	Acre	-7.45000	-73.68333	Nogueira et al. (1999)*
Macapá	Amapá	2.05000	-50.80000	Peracchi et al. (1984)*
Reserva Extrativista Auati-Paraná	Amazonas	-1.98100	-65.68100	This study*
Rio São Francisco	Bahia	-8.96667	-39.53333	Spix (1823)*
São Desidério	Bahia	-12.35000	-44.96667	Pinto-da-Rocha (1995)
Itaetê	Bahia	-12.93333	-41.10000	Gregorin & Mendes (1999)
Santa Luzia	Bahia	-15.41667	-39.33333	Faria et al. (2006)
Pau Brasil	Bahia	-15.45000	-39.65000	Faria et al. (2006)
Iraquara	Bahia	-12.23333	-41.61667	Sbragia & Cardoso (2008)
Paripiranga	Bahia	-10.66667	-37.85000	Rocha et al. (2014)
Sento Sé	Bahia	-9.73333	-41.86667	Rocha et al. (2014)
Riacho de Santana	Bahia	-13.93417	-43.12722	Lapenta & Bueno (2015)
Jequiê	Bahia	-13.958833	-39.99639	Lapenta & Bueno (2015)
Santa Quitéria	Ceará	-4.31667	-40.15000	Rocha et al. (2014)*
Sobradinho	Distrito Federal	-15.53333	-47.86667	Bredt et al. (1999)*
Brazlândia	Distrito Federal	-14.48330	-46.10000	Bredt et al. (1999)
Santa Teresa	Espirito Santo	-19.93019	-40.60415	Ruschi (1951)*
Reserva Biológica da Pedra Azul	Espirito Santo	-19.70000	-39.93330	Ruschi (1972)
Linhares	Espirito Santo	-20.55000	-41.23330	Ruschi (1978)
Padre Bernardo	Goiás	-15.48333	-48.05000	Bredt et al. (1999)*
Padre Bernardo	Goiás	-14.38330	-46.30000	Bredt et al. (1999)
APA Nascentes do Rio Vermelho	Goiás	-14.38333	-46.30000	Esbérard et al. (2005)
Alvorada do Norte	Goiás	-14.50700	-46.73100	Bezerra & Marinho-Filho (2010)
Maçiço do Urucum	Mato Grosso do Sul	-19.31500	-57.60300	Alho et al. (2011)*
Esmeraldas	Minas Gerais	-19.80000	-44.18333	Uieda (1992)*
Itacarambi	Minas Gerais	-18.93330	-48.30000	Trajano & Gimenez (1998)
Curvelo	Minas Gerais	-15.08330	-44.08330	Almeida et al. (2002)
Uberlândia	Minas Gerais	-12.93330	-41.10000	Stutz et al. (2004)
Taperinha	Pará	-2.53333	-54.28333	Piccinini (1974)*
Gradaús	Pará	-7.71667	-51.18333	Piccinini (1974)
Altamira	Pará	-3.30000	-52.33333	Pinto-da-Rocha (1995)
Medicilândia	Pará	-3.45000	-52.88333	Pinto-da-Rocha (1995)
Parauapebas	Pará	-6.01667	-50.30000	Pinto-da-Rocha (1995)
Cabaceiras	Paraíba	-7.48333	-36.28333	Feijó & Langguth (2011)*
João Pessoa	Paraíba	-7.16667	-34.91667	Feijó & Langguth (2011)
Palmeira	Paraná	-25.41757	-50.01644	Thomas (1900)
Rio Branco do Sul	Paraná	-25.41670	-50.00000	Pinto-da-Rocha (1995)
Adrianópolis	Paraná	-25.03330	-49.08330	Pinto-da-Rocha (1995)
Parque Estadual Mata do Godoy	Paraná	-25.15000	-49.30000	Reis et al. (2000)
Parque Estadual Mata do Godoy	Paraná	-25.15000	-49.30000	Reis et al. (2003)
Parque Estadual de Campinhos	Paraná	-23.45000	-51.25000	Arnone & Passos (2007)

Table 1. Cont.

<b>Locality</b>	<b>State</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Author</b>
Parque Estadual Mata do Godoy	Paraná	-25.15000	-49.30000	Reis et al. (2012)
Exu	Pernambuco	-7.50000	-39.70000	Mares et al. (1981)*
Exu	Pernambuco	-7.61667	-39.78333	Mares et al. (1981)
Caruaru	Pernambuco	-8.26667	-35.96667	Sousa et al. (2004)
Betânia	Pernambuco	-8.26667	-38.03333	Cruz et al. (2005)
Toritama	Pernambuco	-7.98333	-36.05000	Astúa & Guerra (2008)
Belo Jardim	Pernambuco	-8.33333	36.41667	Astúa & Guerra (2008)
Brejo da Madre de Deus	Pernambuco	-8.13333	-36.36667	Astúa & Guerra (2008)
Exu	Pernambuco	-7.60000	-39.83333	Astúa & Guerra (2008)
Parque Nacional da Serra das Confusões	Piauí	-8.85000	-43.46667	Gregorin et al. (2008)*
Rio de Janeiro	Rio de Janeiro	-22.90328	-43.20071	Uieda (1986)*
Seropédica	Rio de Janeiro	-22.96670	-43.46670	Piccinini et al. (1991)
Serra da Tiririca	Rio de Janeiro	-22.78330	-43.68330	Teixeira & Peracchi (1996)
Caverna Santana. Cantagalo	Rio de Janeiro	-22.48330	-42.88330	Esbérard et al. (1998)
Parque Estadual da Pedra Branca	Rio de Janeiro	-22.55000	-43.40000	Dias et al. (2002)
Estação Ecológica do Paraíso	Rio de Janeiro	-22.90000	-43.23330	Esbérard (2007)
Reserva Biológica do Tinguá	Rio de Janeiro	-21.98330	-42.36670	Dias & Peracchi (2008)
Porto Velho	Rondônia	-8.76667	-63.90000	Mok et al. (1982)*
Botuverá	Santa Catarina	-27.23472	-49.17910	Pinto-da-Rocha et al. (2001)*
Blumenau	Santa Catarina	-27.21670	-49.15000	Cherem et al. (2004)
Vidal Ramos	Santa Catarina	-27.68330	-48.76670	Cherem et al. (2004)
Santo Amaro da Imperatriz	Santa Catarina	-26.91670	-49.08330	Cherem et al. (2004)
Iguapé	São Paulo	-23.61670	-46.93330	Pira (1904)*
Ribeira	São Paulo	-24.55000	-48.66670	Pinto-da-Rocha (1995)
Cotia	São Paulo	-22.86670	-43.30000	McNab (1969)
Iporanga	São Paulo	-24.40000	-49.00000	Trajano (1985)
Iporanga	São Paulo	-24.58330	-48.70000	Pinto-da-Rocha (1995)
Iporanga	São Paulo	-24.51670	-48.70000	Pinto-da-Rocha (1995)
Iporanga	São Paulo	-24.55000	-48.65000	Pinto-da-Rocha (1995)
Iporanga	São Paulo	-24.71670	-47.55000	Pinto-da-Rocha (1995)
Iporanga	São Paulo	-24.55000	-48.66670	Pinto-da-Rocha (1995)
Iporanga	São Paulo	-24.58330	-48.70000	Pinto-da-Rocha (1995)
Canindé do São Francisco	Sergipe	-9.63333	-37.78333	Leal et al. (2013)*
Itabaiana	Sergipe	-10.68333	-37.41667	Rocha et al. (2014)
São Domingos	Sergipe	-10.78333	-37.56667	Rocha et al. (2014)
Aurora do Tocantins	Tocantins	-12.58200	-46.51700	Almeida (2014)*