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Natural History

New records of *Odocoileus virginianus* (Zimmermann, 1780) (Cetartiodactyla: Cervidae) from northern Brazil

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Abstract

We report new records of the white-tailed deer (*Odocoileus virginianus*) in Brazil based on specimens deposited in scientific collections. These new records expand the known geographic distribution of the species in Brazil southwards in the states of Roraima and Amapá, the latter being the first record of the species below the equatorial line in Brazil, and register it for the first time in the state of Amazonas. These records contribute to the knowledge of the geographical distribution of *O. virginianus* in Brazil and highlight the importance of museum collections as a source of biogeographic and ecological data.

Key words: White-tailed deer, Brazil, geographic distribution.

Resumen

Reportamos nuevos registros del venado cola blanca (*Odocoileus virginianus*) en Brasil basados en especímenes depositados en colecciones científicas. Estos nuevos registros amplían la distribución geográfica conocida de la especie en Brasil hacia el sur en los estados de Roraima y Amapá, este último el primer registro de la especie abajo de la línea del ecuador en Brasil, y lo registran por primera vez en el estado de Amazonas. Estos registros contribuyen al conocimiento de la distribución geográfica de *O. virginianus* en Brasil y destacan la importancia de las colecciones de los museos como fuente de datos biogeográficos y ecológicos.

Palabras clave: Venado cola blanca, Brasil, distribución geográfica.

White-tailed deer *Odocoileus virginianus* (Zimmermann 1780) (Cetartiodactyla: Cervidae) is a New World deer with extensive distribution, ranging from southern Canada throughout North America southwards to northern South America (Smith 1991; Gallina et al. 2010). It has also been introduced in northern Europe, New Zealand, and some Caribbean Islands (Smith 1991; Long 2003; Heffelfinger 2011). In South America *O. virginianus* has been recorded in Venezuela, Colombia, Ecuador, Peru, Bolivia, and northern Brazil (Smith 1991; Gallina et al. 2010; Heffelfinger 2011). Its distribution in Brazil is mainly restricted to the northern Amazonian region, in the states of Roraima, Pará, and Amapá (Mendes-Oliveira

et al. 2011; Silva et al. 2013), but its precise range is still little known, being considered data deficient in the country (Duarte et al. 2012).

Here we present new records of *O. virginianus* using data from mammal collections, which expand its distribution and register the species on a new state of Brazil. Two specimens were deposited in the mammal collection of the Centro de Coleções Taxonômicas of the Universidade Federal de Minas Gerais (CCT/UFMG) that represent new records for this species.

A female (UFMG 4334) (Figure 1a) was collected in Vila Cachoeira de Santo Antônio do Jari, municipality of Laranjal do Jari, Amapá, Brazil (lat: -0.652111, lon: -52.501083, WGS-84; 39.0 m), on October 10th, 2011. This record extends the distribution of *O. virginianus* in Amapá 188 km southwest of the previously known record in the municipality of Porto Grande (Mendes-Oliveira et al. 2011) (Figure 2). A male (UFMG 6087) (Figure 1b) was collected in the Parque Nacional do Viruá, Roraima (lat: 1.290806, lon: -61.151750, WGS-84; 43.0 m), in January 2015. This record is 103 km to the south of the previously known record for the state, in the municipality of Cantá, Roraima (Mendes-Oliveira et al. 2011) (Figure 2).

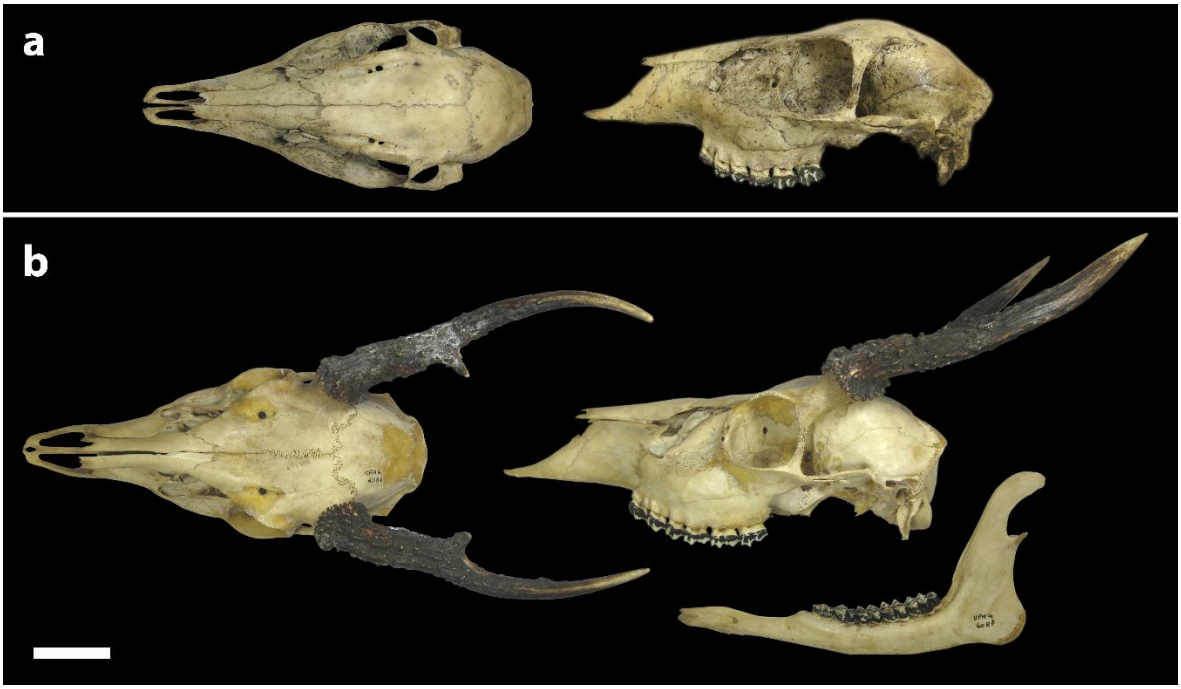

FIGURE 1. Specimens of *Odocoileus virginianus* that represent new records for the species in Brazil. a. UFMG 4334, female from Vila Cachoeira de Santo Antônio do Jari, Laranjal do Jari, Amapá, Brazil (-0.652111, -52.501083); b. UFMG 6087, male from Parque Nacional do Viruá, Roraima, Brazil (1.290806, -61.151750). Scale bar = 50 mm.

We also included records from the Museu Nacional, Universidade Federal do Rio de Janeiro, from which we gathered data on skulls that also represent new records of *O. virginianus* in Brazil. One of these records (MN 69069) is the first for the state of Amazonas, from Serra do Javari, municipality of Barcelos. Additional records were also found for the states of Roraima and Amapá, besides three records, without a specific locality, from near the Cuminá River, in Pará (Table 1). All these specimens lack collection date, although the Pará

specimens were collected during the Comissão Rondon expeditions, likely in the late 1920's.

Mendes-Oliveira et al. (2011) reviewed the geographic range of *O. virginianus* in Brazil and reported the species for the states of Amapá, Pará and Roraima. They consulted the mammal collections of the Museu Paraense Emílio Goeldi (MPEG) (Pará, Brazil), the Museu de Zoologia da Universidade Federal do Pará (MZUFPA) (Pará, Brazil), the Museu de Zoologia da Universidade de São Paulo (MZUSP) (São Paulo, Brazil) and records obtained from the online database VertNet (http://vertnet.org/). Here we updated the records for the species in northern Brazil (Figure 2).

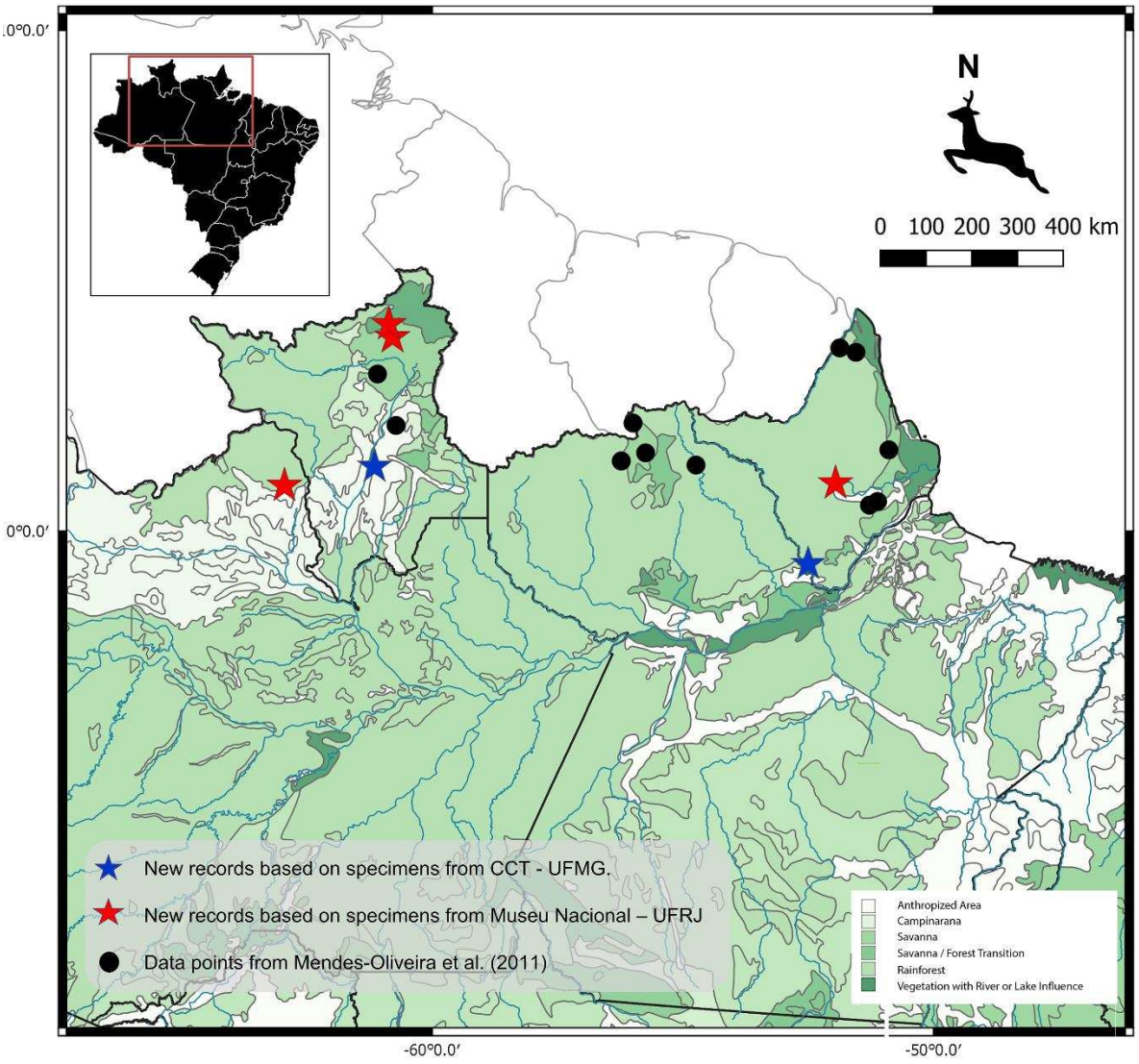

FIGURE 2. White-tailed deer (*Odocoileus virginianus*) records from northern Brazil. Black dots: data from Mendes-Oliveira et al. (2011); red stars: new records from Museu Nacional, UFRJ; blue stars: new records from CCT/UFMG. Vegetation data provided by the Ministério do Meio Ambiente of Brazil (http://mapas.mma.gov.br).

The new data showed here expand the geographic distribution of *O. virginianus* in Brazil. Its presence in the Parque Nacional do Viruá, Roraima, was previously mentioned by Duarte

et al. (2012), but no voucher specimen is available. The record from Laranjal do Jari, Amapá, is the first record of *O. virginianus* below the equator line for Brazil. Calaça et al. (2018) reported the presence of *O. virginianus* for the Saracá-Taquera National Forest, in northwest Pará, but based only in tracks and interviews with the local population. The species may well occur there, but further evidence must be provided. The presence of the species in the state of Amazonas is documented here for the first time.

There is some evidence that the species may be expanding its distribution southwards (Gallina et al. 2010; Duarte et al. 2012). Throughout its range, *O. virginianus* occurs in open tropical plains from sea level up to 4,500 m in the Colombian Andes. In northern Brazil its presence is usually associated to a mosaic of open formations that intersect the tropical rainforest called Campinaranas (Ducke & Black 1954; Egler 1960), but also semideciduous forests, secondary growth and ecotones, avoiding dense forest (Gallina et al. 2010; Heffelfinger 2011; Duarte et al. 2012). The apparent adaptability of the species to human presence and its reliance on forest edges and clearings (Gallina et al. 2010) may imply that the species is favored, in the first moment, by rainforest degradation. Forest cleaning and expansion of agricultural landscapes, forming a mosaic of successional habitats, is speculated to have promoted range expansion of *O. virginianus* in North America (Smith 1991). However, ecological modelling niche studies suggest that land use may play a secondary role to climate change (Dawe & Boutin 2016).

TABLE 1. New records of *Odocoileus virginianus* in northern Brazil.

Specimen	Locality	State	Coordinates
UFMG 4334	Vila Cachoeira de Santo Antônio do Rio Jari, Laranjal do Jari	Amapá	-0.652111, -52.501083
UFMG 6087	Parque Nacional do Viruá, Caracaraí	Roraima	1.290806, -61.151750
MN 1329	Rio Cuminá	Pará	NA
MN 1330	Rio Cuminá	Pará	NA
MN 1331	Rio Cuminá	Pará	NA
MN 69069	Serra do Javari, Barcelos	Amazonas	0.907139, -62.949806 (approximated)
MN 60617	Fazenda Guanabara, Surumú, Pacaraima	Roraima	4.193111, -60.793750 (approximated)
MN 20579	Rio Tracajatuba, Serra do Navio	Amapá	0.955288, -51.954879 (approximated)
MN 84588	Fazenda União, Surumú, Pacaraima	Roraima	4.133389, -60.866694 (approximated)

Population dynamics of the species in South America may differ significantly from those in northern latitudes, since it seems to happen in much lower densities in the Neotropics (Gallina et al. 2010), which may also imply divergent ecologies. The lower density of *O. virginianus* in the Neotropics may be attributed, in part, to the presence of potential competitors, as species of *Mazama*, as well the denser forested environment (Weber 2019). Drastic decreases in population and local extinctions due to over-hunting, habitat degradation, and interactions with domestic and introduced species have been well

documented in areas of Mexico, Central and South America (Long 2003; Gallina et al. 2010). It seems that, despite range expansion, populations in South America may be less numerous nowadays than in the recent past, although no population estimative exist (Gallina et al. 2010).

Populations in South America differ significantly from those of North America (Molina & Molinari 1999; Moscarella et al. 2003; Heffelfinger 2011; Gutiérrez et al. 2017) and may deserve differentiated status (Moscarella et al. 2003; Gallina et al. 2010). White-tailed deer is a prime target for subsistence and trophy hunting throughout its range, and actions of monitoring and management of populations are fundamental to reduce the effects of continuous hunting pressure (Gallina et al. 2010). Establishing the precise geographic distribution of the species in northern Brazil is fundamental for effective conservation measurements for the species in the country (Duarte et al. 2012). This study also highlights the importance of museum collections as a source of biogeographic and ecological data.

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