



The geographic distribution of *Didelphis imperfecta* (Marsupialia: Didelphimorphia): an endemic species to the Guiana Shield, Eastern Amazonia

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The widespread genus *Didelphis* Linnaeus, 1758 comprises six species distributed across the Americas (Cerqueira & Tribe, 2008). These species comprise two main groups according to the color of external ears: the three black-eared species, *D. aurita* (Wied-Neuwied, 1826), *D. marsupialis* Linnaeus, 1758 and *D. virginiana* Kerr, 1792, and the three white-eared species, *D. albiventris* Lund, 1840, *D. imperfecta* Mondolfi and Pérez-Hernández, 1984 and *D. pernigra* Allen, 1900. *Didelphis imperfecta* was described as a subspecies of *D. albiventris* (Mondolfi & Pérez-Hernández, 1984) and included in *D. albiventris* until 1993 (Gardner, 2005). Later, the Guiana population was referred as *Didelphis imperfecta* (Voss & Emmons, 1996) and morphological differences between *D. albiventris* and *D. imperfecta* were described (Lemos & Cerqueira, 2002).

The limits of the distribution of black-eared opossum species are relatively well-known; *D. aurita* inhabiting the Brazilian Atlantic Forest and neighboring areas in Argentina and Paraguay (Cerqueira & Tribe, 2008), and *D. marsupialis* occurring from Mexico to the south, to Peru, Bolivia, Paraguay, northeastern Argentina, the Brazilian Amazon Forest and northern part of the Cerrado morphoclimatic domain, in forested formation and near human settlements (Cerqueira & Tribe, 2008). On the other hand, the distribution of white-eared opossums is not fully understood, with *D. albiventris* occurring from Brazil, excluding the Amazon Basin and most part of the Atlantic Forest domain, down to Bolivia, Paraguay, Uruguay, and central Argentina (Cerqueira & Tribe, 2008). Isolated populations of *D. imperfecta* are found south of the Orinoco in Venezuela and adjacent regions of Brazil as well as the Guianas (Cerqueira & Tribe, 2008; Silva *et al.*, 2013; figure 1). In Brazil, *D. imperfecta* has been recorded in the north of Roraima state (MZUSP22349; Lemos & Cerqueira, 2002), in the north of Pará state, in Faro State Forest (Imazon, 2011) despite lack of voucher specimens for validating this record. It has also been recorded in Monte Dourado, Pará state, Brazil (Leite, 2006), with voucher specimens deposited in the collection of Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas state. Other three localities of Amapá State were recorded by Silva *et al.* (2013), with voucher specimens deposited in the collection Fauna of Amapá (CCFA), located at Instituto de Pesquisas Caramaschi *et al.*: Geographic distribution of *Didelphis imperfecta*

Científicas e Tecnológicas do Estado do Amapá (IEPA). These specimens were collected in terra firme forest, flooded fields and savanna and the localities are exhibited in figure 1.

An inventory of mammals captured with live-traps in areas under anthropic influence, flooded and unflooded forest, and campinarana (patches of open vegetation) was carried out from 1998 to 2003 in the region of Rio Negro, Barcelos and Santa Isabel do Rio Negro municipalities, State of Amazonas. In three major tributaries of Rio Negro, rivers Patauari, Aracá and Preto, nine *Didelphis* specimens belonging to two species were collected and deposited in the mammal collection of Museu Nacional (MN), Universidade Federal do Rio de Janeiro, Brazil. Both species were rare in this area, *D. imperfecta* being less abundant than *D. marsupialis*. Eight *D. marsupialis* specimens were collected in the Rio Negro, two in the right bank (MN53284 and MN69377) and six in the left bank (MN53285, MN59582, MN69140, MN69141, MN69216 and MN69289), where a single male specimen of *D. imperfecta* (MN69111) was also collected in Barcelos municipality, locality Ucuqui in Igarapé Jauari (a small water course) in the right bank of Aracá river (00°45'50"N and 63°26'40"W). *Didelphis marsupialis* was collected in highly altered vegetation and more conserved forest vegetation while *D. imperfecta* was collected only in conserved areas of campinarana. Another study reported these two species in sympatry in Monte Dourado, Pará state, with *D. imperfecta* occurring in more open vegetation, in secondary forest and *Eucalyptus* plantation, and *D. marsupialis* in primary forest (Leite, 2006), indicating that these two species were sympatric but not syntopic. Sympatry of *D. marsupialis* and *D. imperfecta* was also reported in Southern Venezuela and the Guianas (Adler *et al.*, 2006; Catzefflis *et al.*, 1997; Handley, 1976; Julien-Laferrrière, 1991; Lavergne *et al.*, 1997; Ventura *et al.*, 2002). Confirming our findings, *D. imperfecta* appears to be a rare species in several inventories like Kartabo (British Guiana), Aralaye (Central French Guiana) and in Cunucunuma, upper Rio Orinoco (Venezuela) where it was the only marsupial species listed as likely present, but not collected, even during long term studies (Voss & Emmons, 1996).

Didelphis marsupialis was registered in sympatry with *D. albiventris* in the the Cerrado morphoclimatic



domain from Serra do Roncador in Mato Grosso state (Cerqueira, 1985), while *D. albiventris* occurs in sympatry and syntopy with *D. aurita* in altered regions of the Atlantic Forest in the southeast of Brazil (Pedreira municipality, São Paulo state; Bonvicino *et al.*, 2002) and in the highly impacted North-eastern Atlantic Forest of Pernambuco state (Asfora & Pontes, 2009).

The habitat use of *D. imperfecta* appears to be variable. In Brazil, this species was collected in patches of open vegetation in Roraima state, patches of campinarana vegetation in Amazonas state and forested and open vegetation in Amapá state, while, in French Guiana, it occurs in primary forest (Julien-Laferrrière, 1991; Catzefflis *et al.*, 1997; Silva *et al.*, 2013).

The Amazonas River represents the southern limit of *D. imperfecta*. In this report, this limit is extended to the west, to the left bank of Rio Negro, which is probably the extreme western limit of its distribution (Figure 1). Rio Negro is also the western limit of the distribution of other mammalian species like primates (*Alouatta macconnelli* and *Chiropotes israelita*) and rodents (*Makalata didelphoidea*) (Bonvicino *et al.*, 2003; Gregorin, 2006).

The lack of voucher specimens for confirming the limit northern of the occurrence in Brazil of *D. imperfecta* contributes to the dearth of knowledge of this species, a reason why we strongly recommend that collected specimens should be deposited in public mammal collections. Our findings add valuable information about the distribution of *D. imperfecta*, increasing its occurrence area and confirming its endemism to the Guiana Shield.



Figure 1: Approximate geographic distribution of *Didelphis imperfecta* in light gray, and *D. marsupialis* in dark gray (adapted from Cerqueira & Tribe, 2008 and Silva *et al.*, 2013). Black circle indicates the novel occurrence of *D. imperfecta* herein reported.

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