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NOTES ON GEOGRAPHIC DISTRIBUTION

Mammalia, Didelphimorphia, Didelphidae, *Metachirus nudicaudatus*, Municipality of José de Freitas, State of Piauí, Northeastern Brazil: Distribution extension

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The brown four-eyed opossum, *Metachirus nudicaudatus* (É. Geoffroy, 1803), is the only recognized species in the genus *Metachirus* Burmeister, 1854 (Gardner 2005). Recent studies on phylogeography, however, have shown that this opossum comprises distinct monophyletic clades with expressive genetic divergences among them (Costa 2003; Patton and Costa 2003). As these clades are also congruent with geographic units, some authors suggest that *M. nudicaudatus* as currently defined may represent a complex of parapatric species rather than a single species along its geographic distribution area.

Metachirus nudicaudatus has a large geographic distribution that extends from Honduras in Central America to Misiones (Argentina), southern Paraguay, and southern Brazil (Eisenberg and Redford 1999; Gardner 2005; Gardner and Dagosto 2007). In Brazil, the brown four-eyed opossum can be found in four different biomes: Amazonia, Atlantic Forest, *Cerrado*, and *Pantanal* (Fonseca et al. 1996). In the *Cerrado*, its presence appears to be restricted to the contact zones with Amazonia and the Atlantic Forest domains. In fact, we were unable to find any record of this species in the literature for an extensive area in northeastern Brazil that corresponds to the *Caatinga* biome and the central part of the *Cerrado* biome (Emmons and Feer 1997; Eisenberg and Redford 1999; Gardner and Dagosto 2007; Oliveira et al. 2004).

In this report we present the first record of *M. nudicaudatus* in a semi-deciduous forest area from the state of Piauí, northeastern Brazil. Four specimens of *M. nudicaudatus* were collected in an area of semi-deciduous forest located in *Fazenda Nazareth* (04°45' S, 42°35' W), municipality of José de Freitas, north of the state of Piauí. They are two young females belonging to the age class 2, and a subadult male and female belonging to the age class 3 according to Tyndale-Biscoe and Mackenzie (1976).

The 1,200 ha farm is located in the transitional area between the biomes *Caatinga* and *Cerrado* that covers a large part of the state. The area comprises a mosaic of different vegetation types, such as *Cerrado*, *Babaçu* forest (evergreen forest where the palm *Orbignya speciosa* predominates), semi-deciduous forest, and a transitional vegetation type between *Cerrado* and *Babaçu* forest. The climate is tropical semi-arid, with temperatures between 18 and 38°C.

The specimens recorded here were obtained between March and April 2004. Animals were captured in pitfall traps arrayed to survey amphibians, reptiles, and small non-volant

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mammals in the project "*Biodiversidade e Fragmentação de Ecossistemas nos Cerrados Marginais do Nordeste*". Traps consisted of 60 liter buckets buried to the ground level, connected in line by a 10-m-long and 80-cm-high plastic drift fence. We set five trap lines with 10 buckets each. The specimens were deposited in the mammal collections of the *Museu Paraense Emílio Goeldi* (MPEG 36872), Belém, and the *Laboratório de Zoologia, Universidade Federal do Piauí* (LZUFPI 99, 105, 117), Teresina.

The specimens were identified using morphological and skull characters. The former were based on Emmons and Feer (1997): pair of conspicuous patches above the eyes, length and color of the tail and dorsal and ventral color patterns. The skull characters were based on Voss and Jansa (2003): post-orbital process absent and joint between the squamosal and frontal bones, hindering the contact between the parietal and alisphenoid bones, the latter being an exclusive character of the genus *Metachirus*. The identification was further assisted by observations of an agonistic behavior typical of the species which is to chatter teeth when threatened (Rossi et al. 2006).

There are no records of *M. nudicaudatus* from the eastern part of the *Cerrado* domain (Gardner and Dagosto 2007), and this species seems to be absent from the whole *Caatinga* domain (Oliveira et al. 2004). In northeastern Brazil, this species is restricted to the coastal stretch of Atlantic Rainforest (Gardner and Dagosto 2007), and to the western part of the state of Maranhão, already in the Amazonia domain (Oliveira et al. 2008). Therefore, the present record represents a considerable increase in the geographic distribution area of this species, being the first record for the transition area between the *Cerrado* and *Caatinga* biomes (Figure 1).

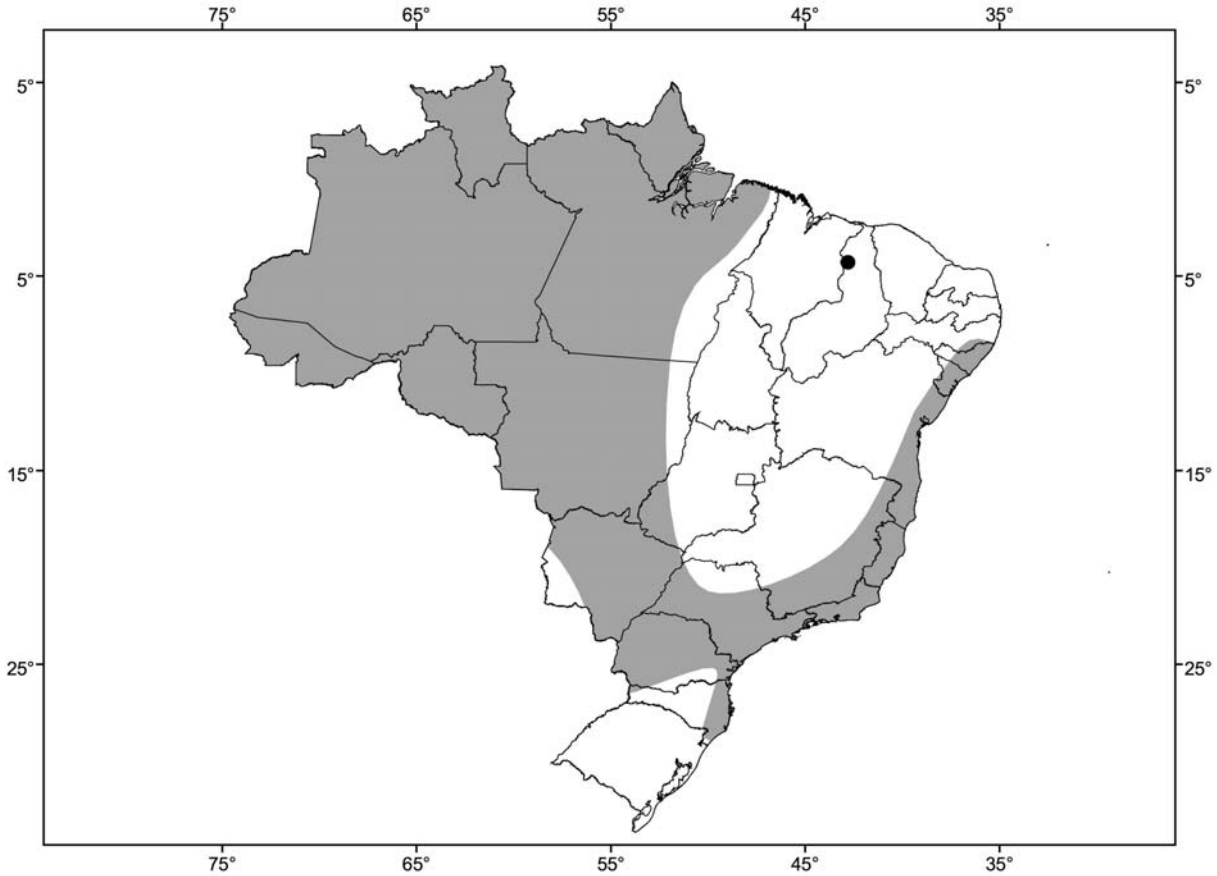

Figure 1. Geographic distribution of *Metachirus nudicaudatus* in Brazil (shaded area) based on Gardner and Dagosto (2007), and the location of Nazareth Farm, municipality of José de Freitas, state of Piauí (point).

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This record is very important from a biogeographical standpoint. According to Castro (2003), the vegetation of the state of Piauí is a complex mosaic of phytophysiognomies, in which the most humid habitats are made up of seasonal semi-deciduous forests, gallery forests, and babaçu forests. The present record of *M. nudicaudatus* suggests that semi-deciduous forests in the northern region of Piauí, which represent mesic habitats, play an important role in the maintenance of typical humid forest mammal species. This assumption is also corroborated by the first records of three other species of arboreal mammals in the same forested habitat: *Micoureus demerarae* (Miranda et al. 2005), *Didelphis marsupialis*, and *Makalata didelphoides* (personal obs. C. L. Miranda), which have specimens currently deposited at the LZUFPI. These records come from patches of semi-deciduous forests at *Fazenda Nazareth* and Parque *Nacional de Sete Cidades*, both in northern Piauí. All but *M. demerarae*, which occurs in the Amazon, Atlantic Forest and gallery forests in the *Cerrado*, are restricted to the Amazonian domain (Emmons and Feer 1997; Redford and Fonseca 1986).

Some authors (e.g., Costa 2003; Lopes et al. 2007; Silva and Bates 2002) suggested that tropical dry forests (deciduous and semi-deciduous forests associated with peripheral depressions) play an important role in the maintenance of forest species within the *Cerrado* domain. Costa (2003) verified the historical importance of gallery and dry forests in central Brazil in connecting populations of small rodents and marsupials from the Amazon and Atlantic forests. According to her, these forests are part of the evolutionary scenario of these groups, playing an important role in the past as well as in the present as a favorable habitat for forest species. The presence of semi-deciduous forests and gallery forests throughout the *Cerrado* domain, particularly in the states of Piauí and Maranhão, would make it possible for typical Amazonian birds to extend their distribution to northeastern Brazil, as shown by the record of six Amazonian bird species in those vegetation types (Lopes et al. 2007).

Given the important role of dry forests in the maintenance of forest species in open biomes, we recommend that detailed surveys should be carried out to determine the real extension of this vegetation type in the *Caatinga* and *Cerrado* domains, along with the physical degree of isolation among forest patches, and between patches and the closest forest sources (Amazon or Atlantic Forest). In addition, faunal inventories are most welcome since it is they only way to find out relictual forest populations, which are interesting materials for genetic, ecological, and conservation research. Finally, inventories associated with genetic studies are the first steps to enhance our knowledge on the evolutionary history of the dry forest patches and the species related to them.

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Literature cited

Castro, A. A. J. F. 2003. Survey of the vegetation in the state of Piauí; p. 117-123 *In* T. Gaiser, M. Krol, H. Frischkorn and J.C. Araújo (ed.). Global change and regional impacts: water availability of ecosystems and society in the semiarid northeastern of Brazil. Berlin: Springer.

Costa, L. P. 2003. The historical bridge between the Amazon and the Atlantic Forests of Brazil: a study of molecular phylogeography with small mammals. Journal of Biogeography 30: 71-86.

Eisenberg, J. F. and K. H. Redford. 1999. Mammals of the Neotropics: The central Neotropics: Ecuador,

NOTES ON GEOGRAPHIC DISTRIBUTION

Bolivia, Brazil. Chicago: University of Chicago Press. 609 p.

Emmons, L. H. and F. Feer. 1997. Neotropical rainforest mammals: a field guide. Chicago: University of Chicago Press. 307 p.

Fonseca, G. A. B., G. Herrmann, Y. L. R., Leite, R. A. Mittermeier, A. B. Rylands, A. B. and J. L. Patton. 1996. Lista anotada dos mamíferos do Brasil. Occasional Papers in Conservation Biology 4: 1-38.

Gardner, A. L. 2005. Order Didelphimorphia; p. 3-18 *In* D. E. Wilson and D. M. Reeder (ed.). Mammal species of the world: a taxonomic and geographic reference. Second edition. Washigton and London: Smithsonian Institution Press.

Gardner, A.L. and M. Dagosto. 2007. Tribe Metachirini; p. 35-39 *In* A.L. Gardner (ed.). Mammals of South America: marsupials, xenarthrans, shrews, and bats. Chicago and London: University of Chicago Press.

Lopes, F. M., S. T. Carvalho and M. P. D. Santos. 2007. Extensão de distribuição da pipira-da-taoca (*Eucometis penicillata*) para o estado do Piauí e leste do Maranhão, Brasil. Atualidades Ornitológicas 137: 40-41.

Miranda, C. L., M. G. M. Lima, M. P. D. Santos and J. S. Silva Júnior. 2005. Ocorrência de *Micoureus demerarae* (Thomas, 1905) no Estado do Piauí. Publicações Avulsas em Conservação de Ecossistemas 2: 1-4.

Oliveira, T. G., R. G. Gerude and J. S. Silva Júnior. 2008. Unexpected mammalian records in the state of Maranhão. Boletim do Museu Paraense Emílio Goeldi, Ciências Naturais 2 (2): 23-32.

Oliveira, J. A., P. R. Gonçalves and C. R. Bonvicino. 2004. Mamíferos da Caatinga; p. 275-302 *In* I. R. Leal, M. Tabarelli and J. M. C. Silva (ed.). Ecologia e conservação da Caatinga. Pernambuco: Editora da Universidade Federal de Pernambuco (EDUFPE).

Patton, J. L. and L. P. Costa. 2003. Molecular phylogeography and species limits in rainforest didelphid marsupials of South America; p. 63-81 *In* M. D. C. Jones and M. Archer (ed.). Predators with pouches: the biology of carnivorous marsupials. Austrália: CSIRO.

Redford, K. H. and G. A. B. Fonseca. 1986. The role of the galery forests in the zoogeography of the cerrado's nonvollant mammalian fauna. Biotropica 18: 126-135.

Rossi, R. V., G. V. Bianconi and W. A. Pedro. 2006. Ordem Didelphimorphia; p. 27-66 *In* N. R. Reis, A. L. Peracchi and I. P. Lima (ed.). Mamíferos do Brasil. Paraná: SEMA-PR.

Silva, J. M. C. and J. M. Bates. 2002. Biogeographic patterns and conservation in the South American cerrado: a tropical savanna hotspot. Bioscience 52 (3): 225-233.

Tyndale-Biscoe, C. H. and R. B. Mackenzie. 1976. Reproduction in *Didelphis marsupialis* and *D. albiventris* in Colombia. Journal of Mammalogy 57 (2): 249-265.

Voss, R. S. and S. A. Jansa. 2003. Phylogenetic studies on didelphid marsupials II. Nonmolecular data and new IRBP sequences: separate and combined analyses of Didelphine relationships with denser taxon sampling. Bulletin of the American Museum of Natural History 276: 82 p.

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