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New Record of the Giant Ground Sloth *Mylodonopsis ibseni* Cartelle, 1991 in the Late Pleistocene of Brazilian Intertropical Region

Novo Registro da Preguiça Gigante Terrestre Mylodonopsis ibseni Cartelle, 1991 no Pleistoceno Final da Região Intertropical Brasileira

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Abstract

In this study, we refined the identification of a giant sloth molariform tooth previously attributed to indeterminate Mylodontinae, which was found in the tank deposit of Fazenda Elefante, Gararu municipality (Sergipe, Brazil). The mesiodistal and vestibulolingual diameters, as well as the index between the mesiodistal and vestibulolingual diameters of tooth LPUFS 1852, were compared with the measurements obtained from caniniforms and first and second molariforms of juvenile and adult individuals of *Ocnotherium giganteum*, *Glossotherium phoenesis*, and *Mylodonopis ibseni*. Based on this comparison, we attributed tooth LPUFS 1852 to the right first lower molariform of a juvenile individual of *Mylodonopsis ibseni*. This identification represents the fifth record of this taxon, which has been recorded in Lagoa Santa/MG, Toca dos Ossos (Ourolândia/Bahia), Gruta dos Brejões (Morro do Chapéu/BA), Fazenda Elefante (Gararu/SE), and Lagoa Tanque (Afrânio/PE).

Keywords: Mylodontinae, Giant sloths, Quaternary

Resumo

Neste estudo, refinamos a identificação de um dente de preguiça gigante previamente atribuído a um Mylodontinae indeterminado encontrado em um depósito de tanque localizado na Fazenda Elefante em Gararu, Sergipe (Brasil). Os diâmetros mésio-distal e vestíbulo-lingual, mais o índice entre os diâmetros mésio-distal e vestíbulo-lingual do dente LPUFS 1852, foram comparados com as medidas obtidas para os caniniformes e primeiros e segundos molariformes de indivíduos juvenis e adultos de *Ocnotherium giganteum*, *Glossotherium phoenesis* e *Mylodonopis ibseni*. Por meio dessa comparação, atribuímos o dente LPUFS 1852 ao primeiro molar inferior direito de um indivíduo juvenil de *Mylodonopsis ibseni*. Esta identificação representa o quinto registro deste táxon que já foi registrado em Lagoa Santa/MG, Toca dos Ossos (Ourolândia/Bahia), Gruta dos Brejões (Morro do Chapéu/BA), e Lagoa Tanque (Afrânio/PE).

Palavras-chave: Mylodontinae; Preguiças gigantes; Quaternário

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1 Introduction

The Late Pleistocene meso-megamammal (body mass > 100 kg) fauna of Sergipe is composed of giant ground sloths (*Eremotherium laurillardi*, *Catonyx cuvieri*, and an indeterminate Mylodontinae), glyptodonts (*Glyptotherium* sp. and *Panochthus* sp.), giant armadillos (*Holmesina paulacoutoi* and *Pachyarmatherium brasiliense*), toxodonts (*Toxodon platensis*), gomphoteres (*Notiomastodon platensis*), giant llamas (*Palaeolama major*), horses (*Equus* (*Amerhippus*) *neogeus*), macraucheniids (*Xenorhynotherium bahiense*), and a sabertooth cat (*Smilodon populator*) (Souza-Cunha et al. 1985; Goes et al. 2002; Dantas 2004; Dantas et al. 2005; Dantas and Zucon 2005; 2007; Dantas 2008; Dantas et al. 2011; França and Dantas 2011). Fossils of these extinct taxa were discovered in tank deposits (formed in natural depressions resembling ancient lagoons) in Monte Alegre (Souza-Cunha et al. 1985), Poço Redondo (Goes et al. 2002; Dantas and Zucon 2005; 2007; Dantas et al. 2011), Gararu (Dantas et al. 2005), Canhoba (Dantas 2008; França and Dantas 2011), and Aquidabã (Dantas 2004) municipalities, and in one cave in Simão Dias municipality (Dantas 2009).

Among these taxa, Mylodontinae giant ground sloth from the tank deposit of Fazenda Elefante, Gararu municipality, Sergipe, Brazil (Figure 1) has not been identified at the species level (Dantas et al. 2005). Mylodontinae are a clade of large sloths that are highly diverse throughout South America, but have more restricted diversity in North America during the latter part of the Cenozoic (Saint-André et al. 2010). Currently, three species of this subfamily are recognized in the Brazilian Intertropical Region – BIR (Figure 1): *Mylodonopsis ibseni* (body mass = ~1,000 kg), which was a species adapted to a mixed-feeder diet (Dantas and Santos 2022); *Ocnotherium giganteum* (1,188 kg) and *Glossotherium phoenesis* (936 kg), both of which were highly specialized diggers with a mixed-feeder diet (Cartelle 1991; Cartelle et al. 2019; Dantas 2022; Santos et al. 2023).

The main objective of this study was to refine the identification of tooth LPUFS 1852, previously attributed to indeterminate Mylodontinae, thereby enabling the inclusion of a new species in the meso-megamammal fauna of the Late Pleistocene in Sergipe, Brazil.

2 Material and Methods

The LPUFS 1852 tooth was previously identified as the first upper molariform of indeterminate Mylodontinae (Dantas et al. 2005). We measured the mesiodistal and vestibulolingual diameters and used the index between the mesiodistal/vestibulolingual measurements ($I_{md/vl}$) of caniniforms (C) and molariforms (M) (Costa et al. 2023) to compare tooth LPUFS 1852 with rounded teeth (caniniforms and first/second molariforms) of the Late Pleistocene Mylodontinae taxa of the BIR (Figure 2): *Ocnotherium giganteum* (dental formula C^{1-2}, M^{1-3}/C_1, M_{1-3}; Cartelle 1992), *Glossotherium phoenesis* (dental formula C^1, M^{1-4}/C_1, M_{1-3}; Cartelle et al. 2019), and *Mylodonopsis ibseni* (dental formula M^{1-5}/M_{1-4}; Cartelle, 1991). The Megalonychidae taxa *Ahytherium aureum* and *Australonyx aquae* were not included because of their smaller caniniforms and molariforms in comparison with those from the Mylodontinae taxa.

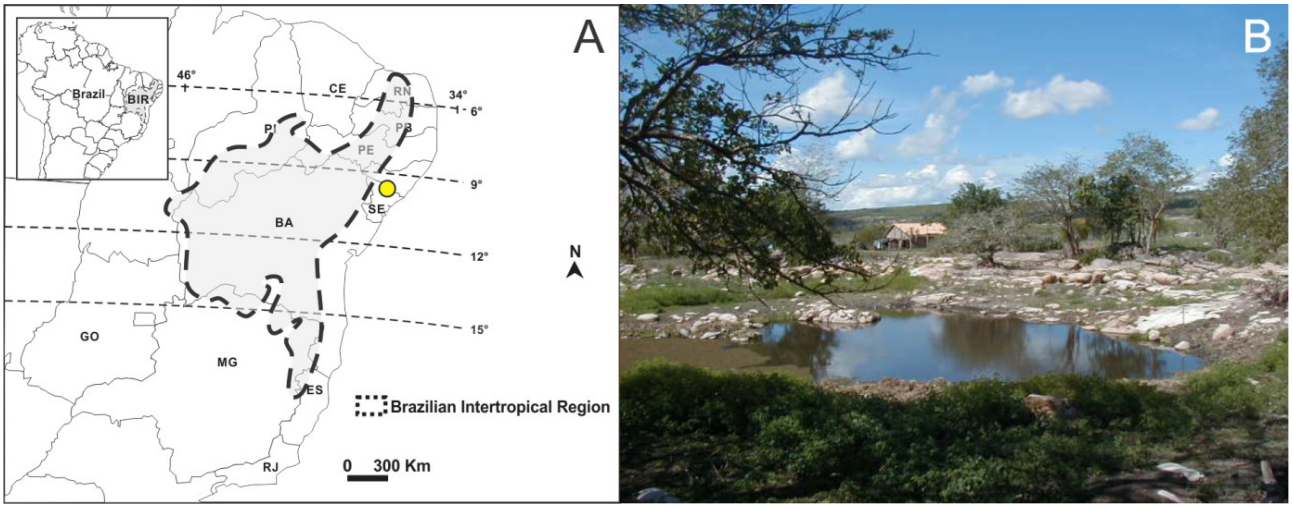

Figure 1 A. Map of the Brazilian Intertropical Region (***sensu*** Dantas et al., 2024) highlighting Gararu municipality in Sergipe, Brazil; B. Natural tank of Fazenda Elefante, Gararu/SE (Image: Mário Dantas, 2005).

The skulls (in ventral view) and dentaries of the studied specimens were measured using ImageJ software (Abràmoff et al. 2004) in photographs and published figures for *Ocnotherium giganteum* (MCL 4346; Dantas and Santos 2022), *Glossotherium phoenesis* (MCL 4027 and MCL 4303; (Cartelle et al. 2019), and *Mylodonopsis ibseni* (MCL 4007, MCL 4352, MCL 4355, and 6525-DGEO-CTG-UFPE; Cartelle 1991; Silva et al. 2010).

3 Results and Discussion

Although there are limited data for these taxa, we can suggest that the upper caniniforms of *O. giganteum* had similar mesiodistal and vestibulolingual diameters ($I_{md/vl}$ = 1.00 and 1.02; Table 1; Figure 3A), while in the lower caniniform, the mesiodistal diameter is 1.8 larger than the vestibulolingual diameter (Table 1; Figure 3A). In

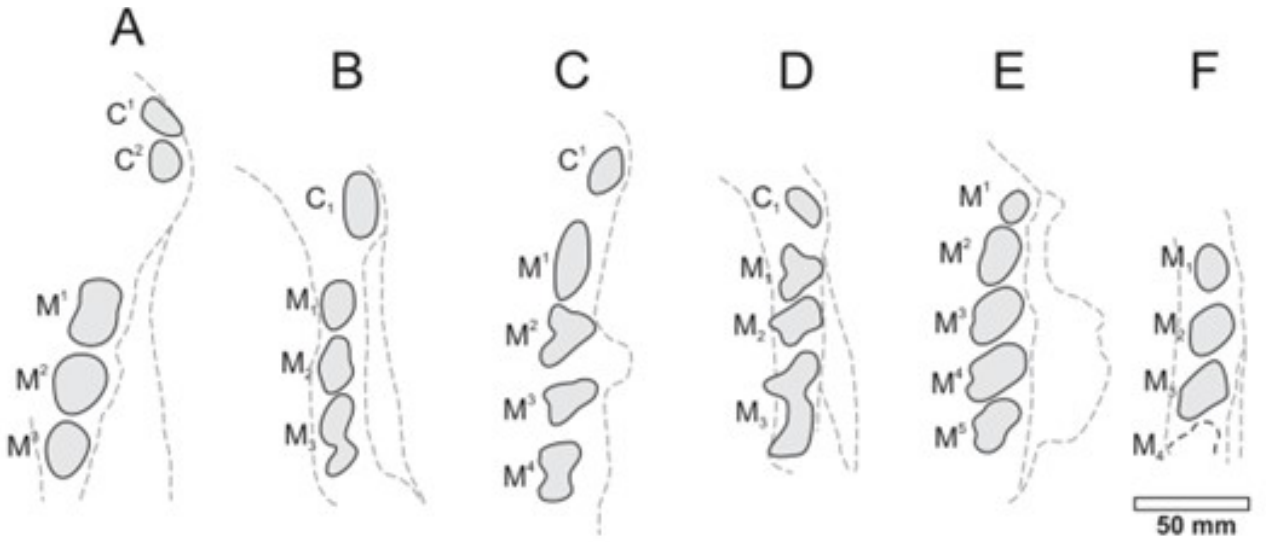

Figure 2 Right teeth series scheme of *Ocnotherium giganteum* (upper – A, lower – B); *Glossotherium phoenesis* (upper – C, lower – D); and *Mylodonopsis ibseni* (upper – E, lower – F).

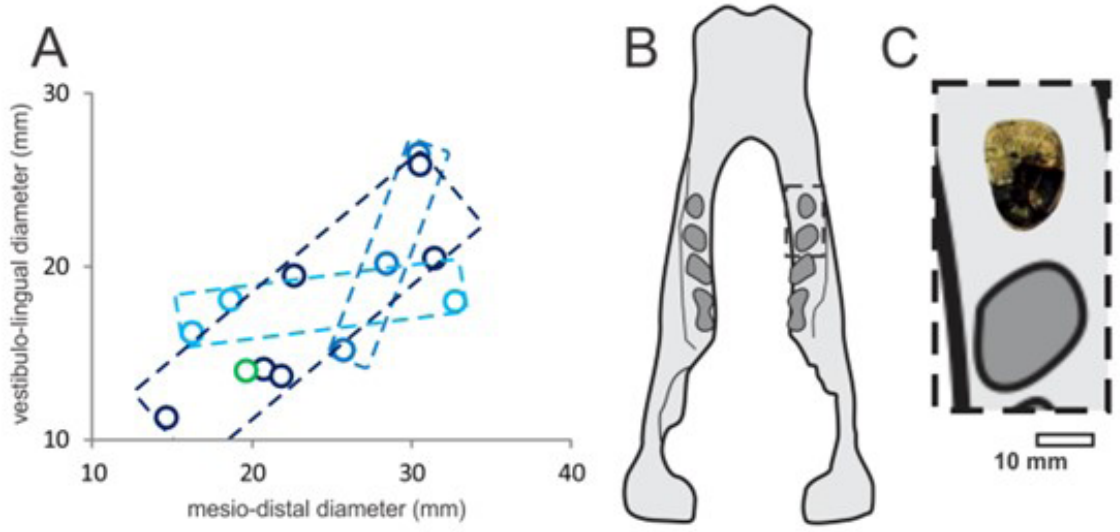

Figure 3 A. Bi-plot graphic of mesiodistal and vestibulolingual diamaters of caniniforms and first molariforms of *Ocnotherium giganteum* (light blue circles; light blue rectangles shows the data distribution), *Glossotheruim phoenesis* (blue circles; blue rectangles shows the data distribution), *Mylodonopsis ibseni* (dark blue circles; dark blue rectangles shows the data distribution), and LPUFS 1852 (green circle); B. Dentary scheme of *Mylodon*, a closely related taxon to *Mylodonopsis*; C. Emphasis on the right lower first and second molariforms of *M. ibseni*, highlighting the right lower first molariform LPUFS 1852.

Table 1 Comparison of the mesiodistal/vestibulolingual diameters and index between the mesiodistal/vestibulolingual (lmd/vl) measurements of caniniforms (C) and first molariforms (M) of LPUFS 1852 with those of *Ocnotherium giganteum*, *Glossotherium phoenesis*, and *Mylodonopsis ibseni*.

taxa	age	teeth	md (mm) x vl (mm)	$I_{md/vl}$
LPUFS 1852	–	–	19.6 x 14.0	1.40
O. giganteum				
MCL 4346	adult	C_1	32.7 x 18.0	1.81
MCL 4346	adult	C^1	18.6 x 18.1	1.02
MCL 4346	adult	C^2	16.2 x 16.2	1.00
G. phoenesis				
MCL 4303	subadult	C_1	25.7 x 15.2	1.69
MCL 4303	subadult	C^1	28.4 x 20.2	1.25
MCL 4727	subadult	C^1	30.4 x 26.5	1.14
M. ibseni				
MCL 4007	adult	M_1	31.4 x 20.5	1.53
MCL 4007	adult	M_2	30.5 x 25.9	1.17
6525-DGEO-CTG-UFPE	juvenile	M_1	20.7 x 14.1	1.46
6525-DGEO-CTG-UFPE	juvenile	M_2	22.6 x 19.5	1.15
MCL 4355	adult	M^1	21.8 x 13.7	1.59
MCL 4352	juvenile	M^1	14.6 x 11.3	1.29

G. phoenesis, the mesiodistal diameter of the caniniforms was approximately one and a quarter times larger than the vestibulolingual diameter ($I_{md/vl}$ = 1.14, 1.25, and 1.69; Table 1; Figure 3A). *M. ibseni* does not have caniniforms, its first upper molariforms had an average $I_{md/vl}$ of 1.44±0.22, the lower first molariforms had an $I_{md/vl}$ of 1.50±0.05, and the second lower molariforms had an $I_{md/vl}$ of 1.16±0.01 (Table 1; Figure 3A).

The mesiodistal and vestibulolingual diameters of LPUFS 1852 were located near M_1 (6525-DGEO-CTG-UFPE) in a juvenile individual and M^1 (MCL 4355) in an adult individual (Figure 3A). Based on this comparison, the $I_{md/vl}$ value of LUFS 1852 (1.40; Table 1) allowed us to assign it to M_1 of *Mylodonopsis ibseni* from a juvenile individual (Figure 3B-C).

It is interesting to note that both M1 and M2 from juvenile and adult individuals had similar $I_{md/vl}$ values (M_1, 1.46 and 1.53; M_2, 1.15 and 1.17; Table 1), indicating the maintenance of these teeth proportions during their growth.

4 Final Remarks

The refined identification of the LPUFS 1852 tooth, as conducted in this study, represents fifth record of this taxon, which has now been recorded in Lagoa Santa/MG, Toca dos Ossos (Ourolândia/Bahia), Gruta dos Brejões (Morro do Chapéu/BA), Fazenda Elefante (Gararu/SE), and Lagoa Tanque (Afrânio/PE). This new record opens up possibilities for future radiocarbon and isotopic studies of this tooth, which will contribute to a better understanding of the paleoecology of *M. ibseni*, a species that is currently poorly understood.

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Author contributions
Mário André Trindade Dantas: conceptualization; formal analysis; methodology; validation; writing-original draft. **Lucas de Melo França**: writing – review and editing. **Alexia David Santos Soares**: writing – review and editing. **Fabiana Silva Vieira**: writing – review and editing.

Conflict of interest
The authors declare no conflict of interest.

Data availability statement
All data included in this study are publicly available in the literature.

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