

Anápolis (MNRJ-4529, 4530, 4531, 4540, 4543, 4732, 4973, 4976, 4977, 4979, 4980, 4986, 4988, 4990, 4991, 4992, 4993, 4994, 4995, 4996, 4997, 4998, 4999, 5000, 5001, 5002, 5003, 23980); Caldas Novas (MNRJ-24003); Mineiros (MNRJ-24475, 24476); Ponte do Ipê Arcado, near to Catalão (MZUSP-2158); **Mato Grosso:** Chapada (MZUSP-94); Rondonópolis (MNRJ-43803); Fazenda Aricá, Rio Aricá (MZUSP-6358, 6359); Dumbá (MZUSP-7030); Poconé (MZUSP-9971); Descalvado (MZUSP-25593); **Mato Grosso Do Sul:** Maracaju (MNRJ-4539, 4541, 4542, 4544, 4972, 4978, 4982); Corumbá (MZUSP-3891); Barra do Paredão, Rio Paraná (MZUSP-4561); Salobra (MZUSP-9972); Três Lagoas, Rio Sucuriú (MZUSP-19968); Fazenda Barma, Brasilândia (MZUSP-28770); **Minas Gerais:** Lagoa Santa (MNRJ-23994); Bambuí (MZUSP-8313, 17296, 17297); Araguari (MNRJ-24004); Lassance (MNRJ-43970); Mocambinho, Manga (MNRJ-28890); Fazenda Santa Idália, Matias Cardoso, Manga (MNRJ-29074); Ribeirão Bananal, Salinas (MNRJ-42849, 42851, 42852); Passos (MNRJ-10052, 10103, 10111); Fazenda Carrapicho, Passos (MNRJ-10047, 10048); São João do Glória, Passos (MNRJ-10057, 10058, 10101, 10105, 10108, 10110, 10113, 10115); Fazenda Bananal, Passos (MNRJ-10089); Fazenda Estiva, Passos (MNRJ-10098); Fazenda Cabuí, Mathias Barbosa (MNRJ-10060, 10069, 10083, 10104); Pirapora (MZUSP-3074); **Espírito Santo:** Santa Teresa (MNRJ-5886, 5887); **Rio De Janeiro:** Fazenda da Lapa, Mangaratiba (MNRJ-10112); Fazenda Três Barras, Bem Posta, Três Rios (MNRJ-10080, 10096); Fazenda da Lapa, São João Marcos (MNRJ-5645); **São Paulo:** Cajuru (MZUSP-6614); Serra de Botucatu (MZUSP-7697); Conchas (MZUSP-13735, 13799, 13802); Bauru (MZUSP-495); Fanca (MZUSP-1099); Itararé (MZUSP-1143); Avanhandava (MZUSP-2844); Itatinga (MZUSP-6490); Echaporã (MZUSP-18811); **Rio Grande do Sul:** Quinta, Rio Grande (MZUSP-22187); São Lourenço (MZUSP-341, 1005, 3892); **Bolívia:** Santa Cruz, Rio Pirahy, Prov. Cercado (MZUSP-5508).

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## New Records of the Yellow Armadillo (*Euphractus sexcinctus*) in the State of Maranhão, Brazil (Xenarthra, Dasypodidae)

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## Resumo

A borda noroeste da área de distribuição geográfica de *Euphractus sexcinctus* é revista com base em novos pontos empíricos determinados para o estado do Maranhão, Brasil. Os novos registros foram levantados através da coleta de espécimes, observações diretas, entrevistas, e espécimes de museus. A espécie foi detectada em 27 localidades inseridas em 4 biomas. Nós registramos o uso de uma grande variedade de mesohabitats

locais (alguns inéditos para o táxon). A área de distribuição geográfica é ampliada para englobar todo o Maranhão, estabelecendo-se um novo limite ao longo do rio Gurupí.

### Abstract

The northwestern limits of the geographic distribution of *Euphractus sexcinctus* were reviewed based on new localities from the state of Maranhão, Brazil. The new records include collected specimens, direct observations, interviews, and museum specimens. The species has been recorded in 27 localities, in four biomes. They appear to use a wide variety of local mesohabitats (some previously unknown for the taxon). The geographic distribution now encompasses all of Maranhão, establishing a new limit to the range along the Rio Gurupí.

### Introduction

The geographic distribution of the yellow armadillo (*Euphractus sexcinctus* Linnaeus, 1758) has to date been underestimated. Its range is poorly outlined, especially in the northwest, for which no localities for its occurrence have been published. Wetzel (1985a, 1985b) and Redford and Wetzel (1985) described a disjunct distribution for *E. sexcinctus*, stating that it appears to occur continuously throughout the north-east (east from the Rio Parnaíba), central-west, south-east and south of Brazil, as well as adjacent regions of Bolivia, Paraguay, Uruguay and Argentina; and in a small isolated area on the frontier region between Brazil and Suriname.

Wetzel (1985b) and Redford and Wetzel (1985) excluded eastern Amazonia from the distribution for *E. sexcinctus* due to a lack of records. The range was mapped using only known localities, a procedure which frequently generates problems in mapping accurate distributions (Cerqueira, 1995). However, Wetzel (1985b) emphasized the need for further research in the eastern Amazon basin. Recently, Emmons and Feer (1990, 1997) reproduced the Redford and Wetzel (1985) map without any alterations. Here we record new localities for *E. sexcinctus* in the state of Maranhão.

TABLE 1: New Localities for the occurrence of *Euphractus*.

Locality	Biome	References
P. I. Awá, R. I. Caru	Amazonia	MPEG-22022
Boa Lembrança	Amazonia	MPEG-23160
Cocal dos Amâncio	Amazonia	MPEG-23162
Buriticupu	Amazonia	MPEG-26255,26256
Alto Alegre	Zona dos Cocais	MPEG-26257,26258
S. José das Verdades	Zona dos Cocais	MPEG-26259
Piratinga	Zona dos Cocais	MPEG-23298
Palmeiral	Zona dos Cocais	MPEG-26260,26261
Barra do Corda	Cerrado	MZUSP-7989,7990
S. Pedro dos Crentes	Cerrado	MPEG-23163
Balsas	Cerrado	MPEG-23196,23299
Fazenda Varjão	Cerrado	MPEG-23161

### Material and Methods

The data were obtained from the mammal collections of the Museu Paraense Emílio Goeldi (MPEG) and Museu de Zoologia da Universidade de São Paulo (MZUSP), and from collections and observations in Maranhão ongoing since 1989 (Tables 1 and 2). The specimens collected were deposited in the MPEG (Table 1). The 27 new records were plotted on the Wetzel (1985b) map for identification of the points which he proposed (Figures 1-A and 1-B). The geographic coordinates below refer to the underlined localities, it was not always possible to obtain the exact coordinates from the collection and observation points:

01. Posto Indígena Awá, Reserva Indígena Caru, upper Rio Turiaçu (about 03°54'S, 46°35'W);
02. Boa Lembrança, municipality of Sítio Novo (05°52'S, 46°42'W);
03. Fazenda Varjão, Pé-de-Coco, municipality of Estreito (06°32'S, 47°27'W);
04. São Pedro dos Crentes, municipality of Estreito (about 06°14'S, 46°08'W);
05. Cocal dos Amâncio, municipality of Arame (04°42'S, 45°55'W);
06. near to Arame (04°42'S, 45°55'W);
07. near to Grajaú (05°49'S, 46°08'W);
08. Barra do Corda (05°30'S, 45°15'W);
09. mouth of the Rio Matão, right tributary of the Rio Balsas, municipality of Balsas (07°01'S, 46°56'W);
10. near to Balsas,

left bank of the Rio Balsas (07°31'S, 46°02'W); 11. Reserva Indígena Araribóia (about 04°57'S, 45°47'W); 12. near to Buriticupu (04°14'S, 46°32'W); 13. Lago dos Rodrigues, municipality of *Lago da Pedra* (04°19'S, 45°08'W); 14. near to Lago da Pedra (04°19'S, 45°08'W); 15. *Rio Estiva*, left tributary of the Rio Mearim, municipality of Bacabal (about 04°12'S, 44°47'W); 16. Rio Bambu, left tributary of the Rio Mearim, municipality of Bacabal (about 04°12'S, 44°50'W); 17. Alto Alegre, municipality of Bacabal (about 04°06'S, 44°57'W); 18. Fazenda Lagoa Nova, municipality of Bacabal (about 04°04'S, 44°58'W); 19. São José das Verdades, municipal-

ity of Bacabal (about 04°57'S, 44°28'W); 20. near to Lago Verde (04°04'S, 44°45'W); 21. Piratininga, left bank of the Rio Piratininga, right tributary of the Rio Mearim, municipality of Bacabal (04°12'S, 44°35'W); 22. Praia do Açúcar, right bank of the Rio Pindaré, municipality of Santa Inês (about 03°39'S, 45°22'W); 23. near to São Mateus (around 04°01'S, 44°27'W); 24. near to Arari (03°28'S, 44°47'W); 25. Palmeiral, municipality of Matões (about 03°40'S, 44°27'W); 26. Brejinho, municipality of Caxias (about 04°47'S, 42°50'W); 27. São Miguel, left bank of the Rio Parnaíba (opposite to União, Piauí), municipality of Caxias (04°39'S, 43°36'W).

TABLE 2: Field data on *Euphractus sexcinctus* in the state of Maranhão.

Locality	Biome	Mesohabitat	Observation Types
Palmeiral	ZC	3, 4, 5	col, cap, tri
Arari	ZC	2	cap, rel
São Mateus	ZC	2, 3, 4	cap, rel
Praia do Açúcar	AM/ZC	4	tri, rel
Alto Alegre	ZC	2, 3, 4	col, cap, tri, rel
Fazenda Lagoa Nova	ZC	1, 2, 4, 5	cap, tri, rel
São José das Verdades	ZC	3, 5	col, tri, rel
Lago Verde	ZC	2, 3, 4	rod, rel
Rio Bambu	ZC	2, 3, 4	cap, tri, rel
Rio Estiva	ZC	2, 3, 4	cap, tri, rod, rel
Piratininga	ZC	2, 3, 4	col, cap, rod, rel
Lago da Pedra	AM/ZC	5	Rod
Lago dos Rodrigues	AM/ZC	4	Rod
Buriticupu	AM	6	col, tri, rod
R. I. Araribóia	AM	6	Cap
Arame	AM	6	cap, rel
Grajaú	AM	6	Rod
Rio Matão	CE	8, 9	tri, rel
Balsas	CE	8	col, cap, rel
Brejinho	TR	7	Rel
São Miguel	TR	7	cap, rel

**Biomes:** AM= "Amazônia Maranhense"; ZC= "Zona dos Cocais"; CE= "Cerrado"; TR= transitional area from the eastern side of the State.

**Mesohabitat:** 1= old orchard near to secondary forest associated with "babaçual"; 2= "babaçual" associated with pasture; 3= "babaçual" associated with plantation; 4= "babaçual" associated with forest patches; 5= "babaçual" associated with secondary forest; 6= unflooded primary/secondary forest; 7= "cerradão"; 8= "cerrado" sensu stricto with gallery forest; 9= plantation continuous with "babaçual" and gallery forest.

**Type of observation:** col= collected; cap= captured live or dead for consumption tri= observations along trails; rod= observations along primary or secondary roads; rel= reports of local informants.

The information on habitat use was obtained through observations along trails, primary and secondary roads, live or dead animals captured for consumption, and from information from local people. Field identification was facilitated by the conspicuous phenotype of this species. The majority of information gathered from local people was used to confirm records and as additional data about mesohabitat use by *E. sexcinctus*.

### Results

Of the 27 localities listed, eleven were confirmed with museum specimens (Table 1). Table 2 lists the localities resulting from our field work, along with the biome, mesohabitat, and type of observation (collected, captured alive or dead for consumption, seen along trails or primary or secondary roads, and reported by local people). The large number of records and habitats for *E. sexcinctus* in the “Zona

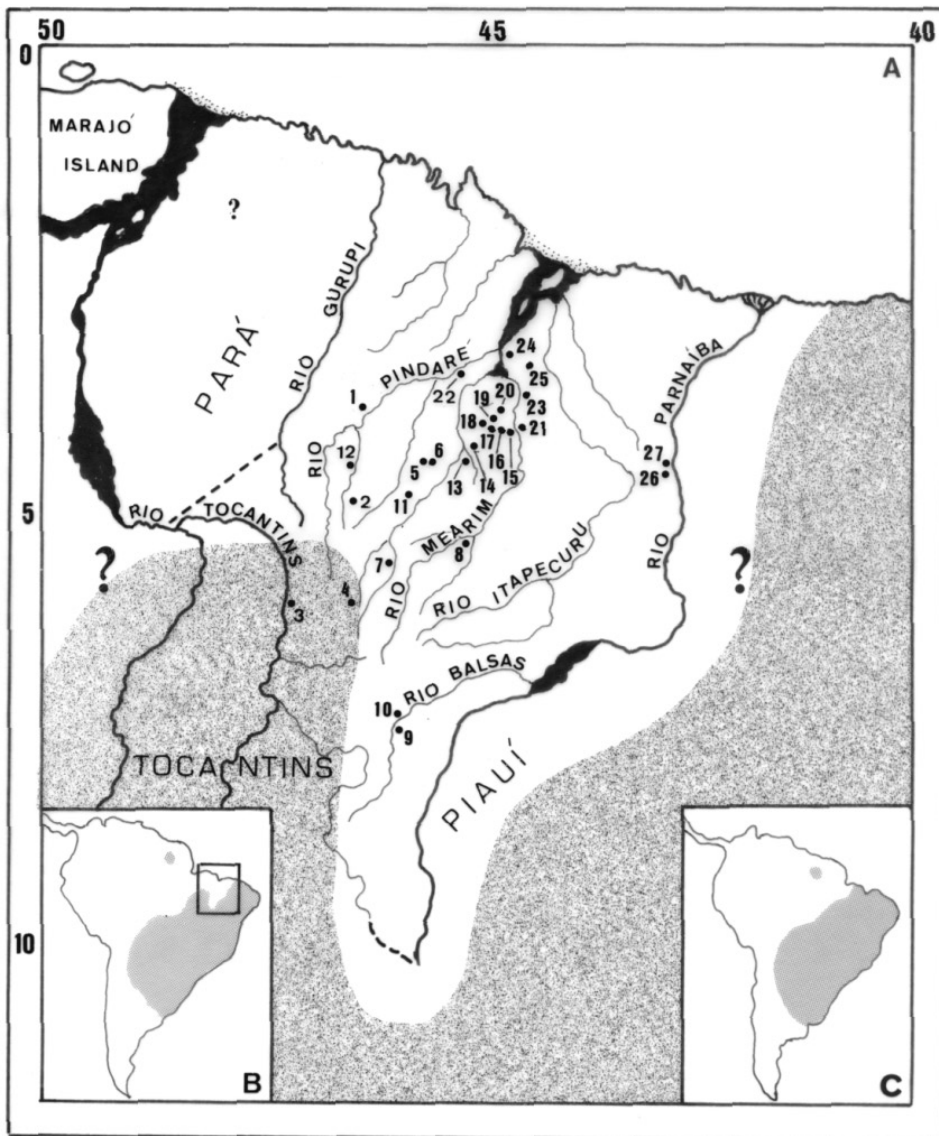


FIGURE 1. A. New localities for the occurrence of *Euphractus sexcinctus*; B. Area in main map; C. Distribution following this paper.

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dos Cocais" (*Orbignya* palm tree forest) is explicable because of the longer time we spent there.

The localities surveyed are in four biomes, and the animals were sighted in a wide variety of local habitats. In the "Pré-Amazônia Maranhense" (Amazonian part of Maranhão) yellow-armadillos used clearings, the border of primary/secondary forest, and the interior of the unflooded secondary forest. In the "Zona dos Cocais" the species was observed in a number of habitats including plantations in primary/secondary forest borders, plantations associated with "babaçal" (*Orbignya* clumps), "babaçal" associated with pasture, copses in different stages of regeneration, and secondary forest. The majority of observations was in "babaçal" associated with copses and in areas of intense anthropic activity (pastures and plantations). In the Cerrado region of the southern part of the state, the armadillos were observed on the border between the "cerrado" *sensu stricto* and the gallery forest of the Rios Balsas and Matão (with "babaçal" and stretches of plantations). Oliveira (1993, 1995) recorded the species in the Parque Estadual de Mirador, located between the Rios Alpercatas and Itapecurú, also in Cerrado. Transitional vegetation predominates in the eastern side of the state, a mosaic of *Orbignya*, Cerrado and Caatinga (xerophytic vegetation). A single animal was captured in an area in "cerradão". The information we obtained in almost all localities inventoried suggested an indiscriminate use of these habitats by *E. sexcinctus*.

### Discussion

Data from available literature indicate that *E. sexcinctus* is able to use a wide range of habitats. According to Mares *et al.* (1981), it supplants the armadillos of the genus *Dasybus*. Mares *et al.* (1981, 1985, 1989), Fonseca and Redford (1984), Schaller (1983), Wetzel (1985a), Redford and Wetzel (1985), Eisenberg (1989), Emmons and Feer (1990, 1997), Olmos (1995) and Brooks (1995) all listed *E. sexcinctus* as occurring in many mesohabitat types of Cerrado, Caatinga, Chaco, and forest borders.

The distributions proposed by Wetzel (1985b) and Redford and Wetzel (1985) for *E. sexcinctus* presented some inconsistencies that were later reproduced by Emmons and Feer (1990, 1997). Despite the emphasis of Emmons and Feer (1990, 1997) on the lack of knowledge about the species' occurrence inside forests, they presented a map encompassing the entire Atlantic Forest. The distributional limits they indicate around the state of Maranhão are not congruent with the major river courses, differences in altitude, or biome, and there mesohabitats which are otherwise occupied by *E. sexcinctus* extending well beyond. The motility of *E. sexcinctus*, makes it likely to occur throughout. The spatial distribution of the 27 localities surveyed suggests that there are no physical barriers for *E. sexcinctus* even extending well into the state of Maranhão. Despite the lack of information on the use of tall forest and coastal formations, the data suggests that all other landscape types (and associated mesohabitats) can be occupied by *E. sexcinctus*.

### Conclusions

The data presented here indicate that the geographic distribution of *E. sexcinctus* should include all of the state of Maranhão, enlarging considerably that previously portrayed by Wetzel (1985b) and Redford and Wetzel (1985). The new north-western border proposed, extends to the Rio Gurupí (Fig. 1c) but further surveys should be carried out in eastern Pará, where, as in the Marajó archipelago, there are mesohabitats similar to those observed to the east in Maranhão.

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We are grateful to Mariana Moncassin Vale for her help in determining the geographic coordinates for many of the localities. Special thanks are due to Cibele Rodrigues Bonvicino for reviewing the text. The Brazilian Institute for the Environment (IBAMA) kindly provided permission to collect the specimens. Part of the work was carried out using grants from CNPq, FAPERJ, FUJB, PIE/CNPq and PROBIO.

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## A Translocation Experiment for the Conservation of Maned Sloths (*Bradypus torquatus*), a Species Threatened with Extinction in the Brazilian Atlantic Forest

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The Atlantic forest covered a significant part of Brazil before the arrival of Europeans in the early 1500s, but today is restricted to less than 10% of its original extent in forest remnants scattered through biological reserves and private properties. As a consequence, many species now have severely reduced and fragmented populations, significantly increasing the chances of extinction due to demographic and environmental stochasticity and genetic deterioration. It is becoming increasingly necessary, therefore, to intervene in order to reduce these risks and improve the conservation status of endangered species in this biodiversity "hotspot".

One initiative has been carried out with maned sloths (*Bradypus torquatus*), an Atlantic forest endemic. This species was chosen because it is a poorly-known forest dweller that is threatened with extinction mainly due to habitat loss and fragmentation. An ongoing experiment translo-