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SHORT COMMUNICATION

# Filling gaps in the distribution of the white-winged vampire bat, *Diaemus youngii* (Phyllostomidae, Desmodontinae): new records for southern Amazonia

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## ABSTRACT

Bats of the subfamily Desmodontinae are the only hematophagous mammals, represented by three species. Among them, *Diaemus youngii* has the fewest records in Brazil, being poorly known demographically and ecologically. We report the first record of *D. youngii* for Mato Grosso state, in central-western Brazil, and provide additional records for the states of Rondônia and Tocantins, in northern Brazil, extending the known distribution of *D. youngii* in the southern Amazon region.

**KEYWORDS:** rainforest, hematophagous bat, Mato Grosso, Rondônia, Tocantins

# Preenchendo lacunas na distribuição do morcego-vampiro de asas brancas, *Diaemus youngii* (Phyllostomidae, Desmodontinae): novos registros para o sul da Amazônia

## RESUMO

Os morcegos da subfamília Desmodontinae compreendem as únicas três espécies de mamíferos hematófagos. Entre elas, *Diaemus youngii* é a espécie com menor número de registros no Brasil, sendo pouco conhecida demográfica e ecologicamente. Nós relatamos o primeiro registro de *D. youngii* para o estado do Mato Grosso, no centro-oeste do Brasil, e fornecemos registros adicionais para os estados de Rondônia e Tocantins, no norte do Brasil. Os registros ampliam a distribuição conhecida de *D. youngii* no sul da região amazônica.

**PALAVRAS-CHAVE:** floresta pluvial, morcego hematófago, Mato Grosso, Rondônia, Tocantins

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Bats of the subfamily Desmodontinae are very relevant to public health, as they are the only hematophagous mammals and major reservoirs and vectors of rabies virus (Johnson *et al.,* 2014). The subfamily contains three species, *Desmodus rotundus* É. Geoffroy, 1810; *Diphylla ecaudata* Spix, 1823; and *Diaemus youngii* (Jentink, 1893) (Gardner 2008). *Diaemus youngii* has the fewest records in Brazil (Kwon and Gardner, 2008), being poorly known demographically and ecologically. The species is listed as "least concern" by the International Union for Conservation of Nature (IUCN) global assessment, mainly due to its wide geographic range (Aguiar *et al.*, 2006; Greenhall and Schutt, 1996; IUCN, 2017). *Diaemus youngii* occurs over most of the Neotropical region, from northeastern Mexico, to Central and South America, reaching its southern limit in Misiones, Northern Argentina (Kwon and Gardner, 2008). In Brazil, the species is present in several phytophysiognomies, from Amazonian forests, through open habitats of the Pantanal, Cerrado and Caatinga biomes, to its southern limits in the Atlantic Forest of Paraná state (Brazil). Despite its wide distribution, records of the species are still rare and scattered (Greenhall and Schutt, 1996; Aguiar *et al.*, 2006; Kwon and Gardner, 2008), especially in southern Amazonia, where a single record was known so far (Tavares *et al.*, 2017). We report here the first record of D. youngii for Mato Grosso state, in central-western Brazil, and provide additional records for the states of Rondônia and Tocantins, in northern Brazil, extending the known distribution of the species in the southern Amazon (Figure 1).

All specimens analyzed here (Table 1) are deposited in the zoological collection of the Museu de Zoologia of Universidade de São Paulo (MZUSP). Its measurements are in accordance with the ones given in literature (see Greenhall and Schutt, 1996).

The three specimens were mist netted during bat inventories. On July 17, 2014, an adult male *D. youngii* (MZUSP 35712) (Figure 2A) from Abunã, district of Porto Velho, Rondônia state (9°35'S, 65°3'W), was collected by the four main authors of the present study. The predominant vegetation type in that area is alluvial ombrophilous dense forest, with medium and large trees, palms, woody vines, and epiphytes (sensu Ivanauskas *et al.*, 2008). The other two specimens refers to unpublished specimens from MZUSP collection. Specimen MZUSP 35713 (Figure 3), represented by a taxidermied skin and separated skull, was collected by Marília Kerr on April, 1997 at the Renato River, a tributary of the Teles Pires River, near the city of Cláudia (11°24'S, 55°2'W), state of Mato Grosso, Brazil. Further details on the

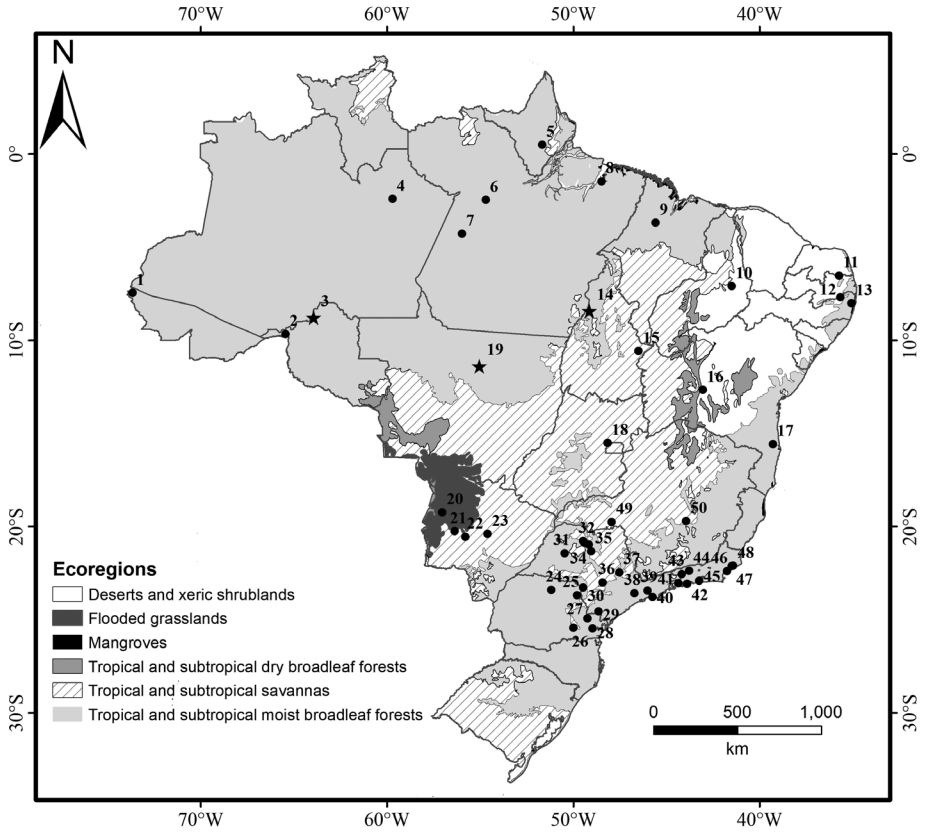


**Figure 1.** Known occurrence localities for *Diaemus youngii.* Stars represent the new records and circles are records from the literature. For key to code numbers, see Supplementary Material, Table S1.

**Table 1.** Sex, external and cranial measurements (in mm) of the *Diaemus youngii* specimens reported in here. RO = Rondônia state, MT = Mato Grosso state, TO = Tocantins state.

| Parameter[1] | MZUSP 35712 (RO) | MZUSP 35713 (MT) | MZUSP 35358 (TO) |
|---|---|---|---|
| Sex | Male | Male | Male |
| Body length | 76.46 | 71.15 | 73.61 |
| Hind foot length | 15.35 | 16.94 | 16.40 |
| Ear length | 17.49 | 16.06 | 18.05 |
| Forearm length | 54.39 | 48.94 | 53.14 |
| Greatest length of skull | 25.99 | 25.83 | 25.01 |
| Condylobasal length | 21.59 | 20.35 | 21.09 |
| Mastoid breadth | 13.20 | 11.84 | 12.69 |
| Zygomatic breadth | 14.20 | 13.94 | 13.84 |
| Breadth of braincase | 13.24 | 12.90 | 12.91 |
| Postorbital constriction | 6.60 | 6.00 | 6.36 |
| Palatal length | 8.08 | 7.82 | 7.61 |
| Breadth across upp/er canines | 6.53 | 6.35 | 6.43 |
| Breadth across upper molars | 6.80 | 6.53 | 6.41 |
| Length of maxillary toothrow | 5.56 | 5.30 | 5.97 |
| Length of mandible | 15.55 | 14.91 | 14.99 |

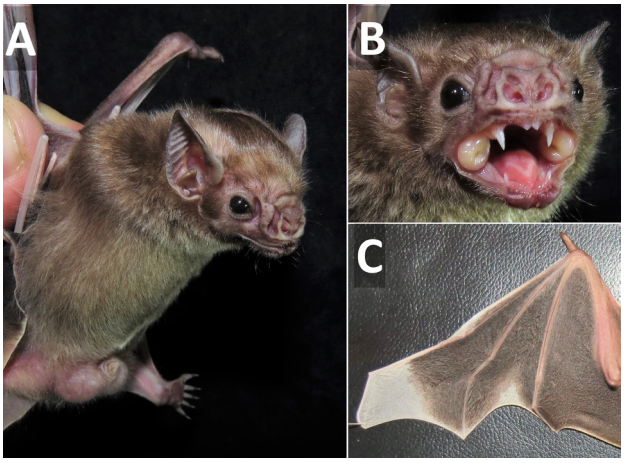


**Figure 2.** (A) *Diaemus youngii* (MZUSP 35712) caught in Porto Velho, state of Rondônia; (B) detail of the pair of glands located laterally on the inner part of the cheeks; (C) detail of the white spot on the distal tip of dactylopatagium. This figure is in color in the electronic version.

**Figure 3.** Dorsal, ventral and lateral views of the skull, and lateral view of the mandible of *Diaemus youngii* (MZUSP 35713) from the state of Mato Grosso, Brazil. Scale bar = 10 mm. This figure is in color in the electronic version.

latter collecting locality are available in Gualda-Barros *et al.* (2012). Specimen MZUSP 35358 (preserved in alcohol) was mist netted in Couto Magalhães (8°21'S, 49°10'W), Tocantins state, in October 2014 during a bat inventory near an electric power transmission line (LT Xingu-Estreito) (Figure 1).

*Diaemus youngii* can be distinguished from the other two desmodontine genera by a suite of morphological characters: a pair of glands located laterally on the inner part of the cheeks (Figure 2B), that are exposed when the bat feels threatened and releases a strong-smelling liquid (Greenhall and Schutt, 1996); a white spot on the distal tip of the dactylopatagium and another spot between digits IV and V (Figure 2C); thumbs with only one basal pad, an absent calcar (in *D. rotundus* the calcar is present/, but greatly reduced, and in *D. ecaudata* it is conspicuous) (Kwon and Gardner, 2008); two upper and one lower molar (i1/2, c1/1, p1/2, m2/1= 22) (Figure 3), while *D. ecaudata* has two lower molars (i2/2, c1/1, p1/2, m2/2= 26) and *D. rotundus* has one upper and one lower (i1/2, c1/1, p1/2, m1/1= 20).

Our review of the records of *D. youngii* in Brazil show that records are concentrated in southeastern Brazil, in the states of São Paulo and Rio de Janeiro (Figure 1). This pattern is possibly a result of a collection bias, as in these two states intensive and long-duration surveys have been carried out, and consequently the bat fauna in the two regions is relatively better known (Esbérard and Bergallo, 2005; Garbino, 2016). Based on our review, there is a large sampling gap in the Cerrado of central Brazil, and in the interior Caatinga.

Roosts used by *D. youngii* include caves and cavities in trees (Aguiar *et al.*, 2006; Greenhall and Schutt, 1996), however, contrary to *D. ecaudata* (Rocha *et al.*, 2014) and *D. rotundus* (Oliveira *et al.*, 2009; Greenhall *et al.*, 1983; Flores-Crespo and Arellano-Sota, 1991; Bredt *et al.*, 1999), the species is not commonly found in caves. *Diaemus youngii* has been found in caves in the southeastern Brazilian state of São Paulo, but with a low capture rate (Trajano, 1984), while in the same state, McNab (1969) and Taddei (Information on the specimen found in the Chiroptera Collection, Department of Zoology, State University of São Paulo, São José do Rio Preto "DZSJRP 16615") sampled the species in cavities in standing trees. In Trinidad, a large colony was found in a hollow *Erythrina micropteryx* tree, and only a single individual was captured in a cave (Goodwin and Greenhall, 1961). Therefore, based on these data, it is suggested that additional records of *D. youngii* may be obtained by searching for roosts in hollow standing trees.

To have additional information on how and where to find the species, data on roost use and colony demographics are of special importance, expanding the knowledge of blood-feeding bats and their biology. The records presented in here contribute to the knowledge on the distribution of *D. youngii* in the Amazon region.

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## SUPPLEMENTARY MATERIAL (only available in the electronic version)

PEDROSO *et al.* Filling gaps in the distribution of the white-winged vampire bat, *Diaemus youngii* (Phyllostomidae, Desmodontinae): new records for southern Amazonia

**Table S1.** Locality records for Diaemus youngii in Brazil. The code numbers refer to the points shown in Figure 1. Datum: SAD69.

| Code | Coordinates | | State | Locality | Reference |
|---|---|---|---|---|---|
| | Lat | Long | | | |
| 1 | 7º 27› 00» S | 73º 41′ 00″ W | AC | Parque Nacional da Serra do Divisor, Cruzeiro do Sul | Nogueira ***et al.*** (1999) |
| 2 | 9º 39′ 00″ S | 65º 27′ 00″ W | RO | Distrito de Abunã, Porto Velho | **This study** |
| 3 | 8º 48′ 06″ S | 63º 57′ 03″ W | RO | UHE Santo Antônio, Porto Velho | Tavares ***et al.*** (2017) |
| 4 | 2º 24′ 00″ S | 59º 43′ 00″ W | AM | Projeto Dinâmica Biológica de Fragmentos Florestais (PDBFF), Manaus | Bernard (2001) |
| 5 | 0º 30′ 00″ S | 51º 40′ 00″ W | AP | Santa Luzia do Pacui, Macapá | Peracchi ***et al.*** (1984) |
| 6 | 2º 27′ 02″ S | 54º 42′ 03″ W | PA | Taperinha, Santarém | Piccinini (1974) |
| 7 | 4º 16′ 39″ S | 55º 59′ 04″ W | PA | Iataituba | Reis & Schubart (1979) |
| 8 | 1º 27′ 21″ S | 48º 29′ 25″ W | PA | Utinga, Belém | Handley (1967) |
| 9 | 3º 41′ 00″ S | 45º 35′ 00″ W | MA | Tufilândia | Dias ***et al.*** (2009) |
| 10 | 7º 04′ 54″ S | 41º 29′ 55″ W | PI | Picos | Pinto & Bento (1986) |
| 11 | 6º 31′ 00″ S | 35º 44′ 00″ W | PB | Parque Estadual Pedra da Boca, Araruna | Feijó et al. (2010) |
| 12 | 7º 41′ 00″ S | 35º 39′ 00″ W | PB | Lagoa da Pedra, Lajes, Umbuzeiro | Feijó & Langguth (2011) |
| 13 | 8º 00′ 00″ S | 35º 03′ 00″ W | PE | Estação Ecológica do Tapacurá, São Lourenço da Mata | Mares et al. (1981) |
| 14 | 8º 25′ 29″ S | 49º 07′ 24″ W | TO | Estreito, Couto Magalhães | **This study** |
| 15 | 10º 34′ 00″ S | 46º 30′ 00″ W | TO | Estação Ecológica Serra Geral do Tocantins | Gregorin et al. (2011) |
| 16 | 12º 39′ 00″ S | 43º 03′ 00″ W | BA | Nas proximidades de Paratinga, Vale Médio do Rio São Francisco | Sá-Neto & Marinho Filho (2013) |
| 17 | 15º 34′ 00″ S | 39º 17′ 00″ W | BA | Fazenda São José | Falcão (2007) |
| 18 | 15º 30′ 00″ S | 48º 10′ 00″ W | DF | Brazlândia | Aguiar et al. (2006) |
| 19 | 11º 24′ 03″ S | 55º 02′ 58″ W | MT | Cláudia | **This study** |
| 20 | 19º 13′ 10″ S | 57º 02′ 30″ W | MS | Nhecolândia | Oliveira et al. (2012) |
| 21 | 20º 14′ 10″ S | 56º 22′ 30″ W | MS | Miranda | Oliveira et al. (2012); Leite et al. (1998) |
| 22 | 20º 32′ 23″ S | 55º 47′ 43″ W | MS | Aquidauana | Oliveira et al. (2012) |
| 23 | 20º 23′ 11″ S | 54º 36′ 27″ W | MS | Instituto São Vicente, Campo Grande | Urbieta et al. (2017) |
| 24 | 23º 23′ 00″ S | 51º 11′ 00″ W | PR | Parque Estadual Mata do Godoy | Reis et al. (2003) |
| 25 | 23º 40′ 25″ S | 49º 47′ 36″ W | PR | Siqueira Campos | Margarido & Braga (2004) |
| 26 | 25º 25′ 26″ S | 50º 00′ 16″ W | PR | Palmeira | Thomas (1899) |
| 27 | 24º 54′ 58″ S | 49º 14′ 33″ W | PR | Cerro Azul | Graciolli & Carvalho (2001) |
| 28 | 25º 28′ 00″ S | 48º 58′ 00″ W | PR | Estação Roça Nova, Piraquara | Miller (1906) |
| 29 | 24º 33′ 00″ S | 48º 39′ 00″ W | SP | Caverna Alambari de Baixo, Iporanga | Trajano (1984) |
| 30 | 23º 15′ 27″ S | 49º 28′ 01″ W | SP | Sarutaiá | Uieda (1993) |
| 31 | 21º 25′ 00″ S | 50º 28′ 00″ W | SP | Bilac | Garbino (2016) |
| 32 | 20º 46′ 00″ S | 49º 28′ 00″ W | SP | APA Grota de Mirassol, Mirassol | Garbino (2016) |
| 33 | 20º 52′ 00″ S | 49º 24′ 00″ W | SP | Mata dos Macacos, São José do Rio Preto | Garbino (2016) |
| 34 | 20º 57′ 00″ S | 49º 10′ 00″ W | SP | Uchoa | Garbino (2016) |
| 35 | 21º 19′ 00″ S | 49º 03′ 00″ W | SP | Itajobi | Garbino (2016) |
| 36 | 22º 59′ 00″ S | 48º 26′ 00″ W | SP | Botucatu | Uieda (2005) |
| 37 | 22º 27′ 00″ S | 47º 32′ 00″ W | SP | Fazenda Paraguassu, Santa Gertrudes | Sazima & Uieda (1980) |
| 38 | 23º 34′ 00″ S | 46º 43′ 00″ W | SP | Butantan, São Paulo | Vieira (1942) |

**Table S1.** Continued

| Code | Coordinates | | State | Locality | Reference |
|---|---|---|---|---|---|
| | Lat | Long | | | |
| 39 | 23º 25′ 00″ S | 46º 01′ 00″W | SP | Guararema | Garbino (2016) |
| 40 | 23º 46′ 00″ S | 45º 45′ 00″W | SP | Barra do Uma, São Sebastião | Garbino (2016) |
| 41 | 23º 02′ 00″ S | 44º 21′ 00″W | RJ | Ilha da Gipóia, Angra dos Reis | Carvalho et al. (2011) |
| 42 | 23º 04′ 00″ S | 43º 53′ 00″W | RJ | Ilha de Marambaia, Rio de Janeiro | Lourenço et al. (2010) |
| 43 | 22º 32′ 00″ S | 44º 11′ 00″W | RJ | Barra Mansa | Peracchi & Albuquerque (1971) |
| 44 | 22º 22′ 00″ S | 43º 47′ 00″W | RJ | Santuário da Vida Silvestre da Serra da Concórdia, Barra do Piraí | Modesto et al. (2008) |
| 45 | 22º 54′ 00″ S | 43º 14′ 00″W | RJ | U.F.R.R.J., Seropédica | Peracchi & Albuquerque (1984) |
| 46 | 22º 23′ 00″ S | 41º 45′ 00″W | RJ | Parque Nacional da Restinga de Jurubatiba, Macaé | Luz et al. (2011) |
| 47 | 22º 07′ 00″ S | 41º 29′ 00″W | RJ | Carmo | Avilla et al. (2001) |
| 48 | 22º 06′ 00″ S | 41º 25′ 00″W | RJ | Parque Nacional Restinga de Jurubatiba, Quissamã | Bergallo et al. (2004) |
| 49 | 19º 44′ 51″ S | 47º 56′ 21″W | MG | Uberaba | Uieda (1993); Stutz et al. (2004) |
| 50 | 19º 42′ 00″ S | 43º 56′ 00″W | MG | São José da Lapa | Torquetti et al. (2013) |


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