



Updated distribution maps with new records of *Trilepida fuliginosa* (Passos, Caramaschi & Pinto, 2006) and *Drepanoides anomalus* (Jan, 1863) (Squamata, Serpentes) in the state of Maranhão, northeastern Brazil

Thaís B. Guedes^{1,2}, Aryel Queiroz¹, Patrícia Sousa¹, Breno Hamdan³

1 Universidade Estadual do Maranhão, Centro de Estudos Superiores de Caxias, Programa de Pós-Graduação em Biodiversidade, Ambiente e Saúde, Praça Duque de Caxias s/n, Morro do Alecrim, 65604-380, Caxias, Maranhão, Brazil. **2** Gothenburg Global Biodiversity Center, University of Gothenburg, Department of Biological and Environmental Sciences, Box 461, SE-405 30, Göteborg, Sweden. **3** Instituto Vital Brazil, Laboratório de Coleções Biológicas e Biodiversidade, 24230-410, Niterói, RJ, Brazil.

Corresponding author: Thaís Guedes, thaisbguedes@yahoo.com.br

Abstract

We report for the first time *Trilepida fuliginosa* (Passos, Caramaschi & Pinto, 2006) and *Drepanoides anomalus* (Jan, 1863) in the state of Maranhão, Brazil. Our record for *T. fuliginosa* represents the northernmost locality for the species and extends its geographic distribution by nearly 662 km (in a straight line) from São Geraldo do Araguaia, state of Pará. Our record for *D. anomalus* is the easternmost known occurrence and extends its distribution by 203 km from Piçarra, Pará. Updated distribution maps and images of preserved specimens are provided.

Keywords

Ecoregions, range extension, South America.

Academic editor: Josué Anderson Rêgo Azevedo | Received 1 January 2020 | Accepted 16 March 2020 | Published 10 April 2020

Citation: Guedes TB, Queiroz A, Sousa P, Hamdan B (2020) Updated distribution maps with new records of *Trilepida fuliginosa* (Passos, Caramaschi & Pinto, 2006) and *Drepanoides anomalus* (Jan, 1863) (Squamata, Serpentes) in the state of Maranhão, northeastern Brazil. Check List 16 (2): 423–433. <https://doi.org/10.15560/16.2.423>

Introduction

The Brazilian state of Maranhão is in the north-central part of the country and has a vast area of over 329,000 km² (IBGE 2019a). Maranhão has a wide variety of geomorphological formations, soil types, altitudinal gradients, and climates which result in a high heterogeneity of phytophysionomies (Ab'Saber 1960). Within the state five ecoregions are recognized: Cerrado Savannas, Tocantins Pindaré Moist Forest, Amazon-Ori-noco-Southern Caribbean mangroves, Northeast Brazil

Restingas, and Maranhão Babaçu Forests (Dinerstein et al. 2017); the last one is recognized as a world biodiversity hotspot (Myer et al. 2000; Mittermeier et al. 2005). Although Maranhão is known for its rich biodiversity, there are very few researchers in the state, which results in a huge knowledge gap in the composition and distribution of its biodiversity (Martins and Oliveira 2011; Barros 2012; Freitas et al. 2017; Guedes et al. 2018).

Only a few studies have been published on squamate reptiles of Maranhão. Most are inventories that focus especially on Amazonia in the northwestern part of the

state (e.g. Barreto et al. 2011; Miranda et al. 2012; Freitas et al. 2017), while others studies conducted in large scale and more general also provided some species composition data for the state (e.g. Cunha and Nascimento 1993; Avila-Pires 1995; Guedes et al. 2014a, 2014b, 2018; Ribeiro-Júnior 2015a, 2015b, 2016, 2017). To fill knowledge gaps of species compositions and distributions of the snakes of Maranhão, we provide new records for two snake species—*Trilepida fuliginosa* (Passos, Caramaschi & Pinto, 2006) and *Drepanoides anomalus* (Jan, 1863).

Trilepida fuliginosa (Leptotyphlopidae) is a small threadsnake (maximum total length 303 mm) described from the holotype and 41 paratypes. It is distinguished from other species of *Trilepida* in having the rostral shape subtriangular in dorsal view, the naris located at pupil level, a uniformly dark brown dorsal color pattern, 198–218 middorsal scales, and 14–20 subcaudal scales (Passos et al. 2006). This species is fossorial, and much of what is known about its distribution came from the material collected during the implementation of three hydroelectric plants (Queimados, Luiz Eduardo Magalhães, and Serra da Mesa) in the states of Minas Gerais, Goiás, and Tocantins. To date, *T. fuliginosa* is known to occur at only nine localities in the northern and central Brazilian Cerrado, from the eastern of Minas Gerais to the central region of Tocantins (Passos et al. 2006).

Drepanoides anomalus (Dipsadidae) is a medium-sized (maximum total 837 mm) terrestrial snake (Cunha and Nascimento 1978, 1993; Martins and Oliveira 1998). It is distinguished from other species in having 15 dorsal scales without reduction, no loreal plate, no tooth on the maxillary and either with a groove or a closed canal, the temporals present, the vertebral and paravertebral scales almost equal in size, the anal scale single, 162–180 ventrals, 74–82 subcaudals, a bright coral-red dorsum with a black tip on each scale, the head and anterior portion of the neck grayish black, and the venter unspotted (Peters and Orejas-Miranda 1970; Cunha and Nascimento 1978, 1993). Although considered rare, this species is widely distributed in the Amazon Rainforest and has been recorded in southern Guyana, eastern Ecuador and Peru, northern Bolivia, and Brazil, where it occurs in the states

of Acre, Rondônia, Amazonas, Pará, Roraima, Amapá, and Mato Grosso (Costa and Bérnills 2018; Nogueira et al. 2019).

We report the first occurrences of *Trilepida fuliginosa* and *Drepanoides anomalus* for the state of Maranhão, Brazil. The new data are based on specimens examined in the herpetological collection of the Museu Paraense Emílio Goeldi during the development of the project “Unveiling the high diversity of the snakes of the Mid-North Region of Brazil”, led by TBG.” Along with the new records, we also present updated maps of geographic distribution considering the literature data available (Table 1).

Methods

We found specimens of *Trilepida fuliginosa* and *Drepanoides anomalus* deposited in the herpetological collection of Museu Paraense Emílio Goeldi (MPEG; Belém, Pará). We carefully examined the specimens and measured snout vent length (SVL), tail length (CL), and total length (TL) using a tape measure in millimeters. For *T. fuliginosa*, we followed Lehr et al. (2002) for scale features and measurements, and Wallach (2003) for terminology of cephalic shields. For *D. anomalus*, we counted ventral and subcaudal scales following Dowling (1951). We took high-resolution photographs of specimens of both species in dorsal and ventral views of the body, as well as dorsal, ventral, and lateral views of the head.

We reviewed the literature for occurrence records of both species in South America. Updated distribution maps for each species were drawn using QGIS v. 2.14.

Results

Trilepida fuliginosa (Passos, Caramaschi & Pinto, 2006)

Figures 1, 2

New record. Material examined. BRAZIL • 1 ♂, 188 mm SVL, 16 mm CL, TL/CL 12.75; state of Maranhão, Urbano Santos, Santo Amaro Farm; 03.2494°S,

Table 1. Literature and herpetological collection data of occurrences of *Trilepida fuliginosa* and *Drepanoides anomalus* in South America. *Prudente et al. (2019) reported an important compilation of museum data. Since we examined only MPEG 21523, and not all specimens of *T. fuliginosa* in Prudente's list, we call attention that these data could hide taxonomic error.

Species	Locality	Latitude	Longitude	Reference
<i>Trilepida fuliginosa</i>	Santo Amaro Farm, municipality of Urbano Santos, state of Maranhão, Brazil	–03.2494°	–043.4164	This study
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Queimados, between municipalities of Luziânia in the state of Goiás and Unai in the state of Minas Gerais (type-locality), Brazil	–16.35°	–046.90°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Luiz Eduardo Magalhães, municipality of Lageado, state of Tocantins, Brazil	–09.7254°	–048.3600°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Municipality of Peixe, state of Tocantins, Brazil	–12.0167°	–048.5333°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Luiz Eduardo Magalhães, municipality of Porto Nacional, state of Tocantins, Brazil	–10.7036°	–048.4163°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Luiz Eduardo Magalhães, municipality of Palmas, state of Tocantins, Brazil	–10.30°	–048.35°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Serra da Mesa, municipality of Minaçu, state of Goiás, Brazil	–13.491°	–048.359°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Municipality of Paranã, state of Tocantins, Brazil	–12.6000°	–047.8667°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Queimados, between municipalities of Cristalina in the state of Goiás, and Unai and Cabeceira Grande in the state of Minas Gerais, Brazil	–16.213°	–047.314°	Passos et al. 2006
<i>Trilepida fuliginosa</i>	Serra das Andorinhas, Santa Cruz, municipality of São Geraldo do Araguaia, state of Pará, Brazil	–06.2274°	–048.4440°	Nogueira et al. 2019

Species	Locality	Latitude	Longitude	Reference
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Estreito, municipality of Carolina, state of Maranhão, Brazil	−07.41°	−047.28°	Prudente et al. 2019*
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Estreito, municipality of Estreito, state of Maranhão, Brazil	−06.82°	−047.21°	Prudente et al. 2019*
<i>Trilepida fuliginosa</i>	Hydroelectric Plant of Estreito, municipality of Darcinópolis, state of Tocantins, Brazil	−06.775°	−047.752°	Prudente et al. 2019*
<i>Drepanoides anomalus</i>	Hydroelectric Plant of Estreito, municipality of Carolina, Filadelfia village, state of Maranhão, Brazil	−07.41°	−047.28°	This study
<i>Drepanoides anomalus</i>	Cayenne, Guiana Francesa	04.9182°	−052.3191°	Vidal et al. 1998
<i>Drepanoides anomalus</i>	Mana, Guiana Francesa	05.652°	−053.830°	Vidal et al. 1998
<i>Drepanoides anomalus</i>	Dureno, Sucumbios, Ecuador	−00.03°	−076.500°	Duellman 1978
<i>Drepanoides anomalus</i>	Municipality of Bela Vista do Araguaia, state of Pará, Brazil	−01.065°	−046.789°	Cunha and Nascimento 1978
<i>Drepanoides anomalus</i>	Municipality of Benevides, state of Pará, Brazil	−01.361°	−048.245°	Cunha and Nascimento 1993
<i>Drepanoides anomalus</i>	Municipality of Ananindeua, state of Pará, Brazil	−01.366°	−048.372°	Cunha and Nascimento 1978, 1993
<i>Drepanoides anomalus</i>	Municipality of Belém, state of Pará, Brazil	−01.445°	−048.5°	Cunha and Nascimento 1978, 1993
<i>Drepanoides anomalus</i>	Putumayo, Colombia	−00.5154°	−075.9317°	Wallach et al. 2014
<i>Drepanoides anomalus</i>	Beni, Bolivia	−10.8276°	−065.3613°	Fugler et al. 1995
<i>Drepanoides anomalus</i>	La Paz, Bolivia	−16.5053°	−068.1086°	Wallach et al. 2014
<i>Drepanoides anomalus</i>	Morona-Santiago, Ecuador	−02.3051°	−078.1147°	Wallach et al. 2014
<i>Drepanoides anomalus</i>	Napo, Ecuador	−0.9123°	−077.8128°	Wallach et al. 2014
<i>Drepanoides anomalus</i>	Canelos, Pastaza, Ecuador	−1.5898°	−077.7541°	Andrade 2010
<i>Drepanoides anomalus</i>	Juyu Intza, Pastaza, Ecuador	−02.1080°	−076.1885°	Andrade 2010
<i>Drepanoides anomalus</i>	Andoas, Pastaza, Ecuador	−02.5000°	−076.6300°	Andrade 2010
<i>Drepanoides anomalus</i>	Municipality of Manaus, state of Amazonas, Brazil	−03.102°	−060.020°	Martins and Oliveira 1998
<i>Drepanoides anomalus</i>	Municipality of Candeias do Jamari, state of Rondônia, Brazil	−08.780°	−063.702°	Silva Jr. 1993
<i>Drepanoides anomalus</i>	Ucayali, Peru	−10.1030°	−073.8172°	Lehr 2002
<i>Drepanoides anomalus</i>	Municipality of Juara, state Mato Grosso, Brazil	−10.3450°	−057.6722°	Ávila and Kawashita-Ribeiro 2011
<i>Drepanoides anomalus</i>	Parque Estadual do Utinga, municipality of Belém, state of Pará, Brazil	−01.4265°	−048.4274°	Cunha and Nascimento 1978; Ávila-Pires et al. 2018
<i>Drepanoides anomalus</i>	Municipality of Guajará-Mirim, state of Rondônia, Brazil	−10.7621°	−065.3128°	Bernarde et al. 2012; Ávila-Pires et al. 2009
<i>Drepanoides anomalus</i>	Extrativist Reserve Ituxi, state of Amazonas, Brazil	−08.3300°	−065.7167°	Ávila-Pires et al. 2009
<i>Drepanoides anomalus</i>	Municipality of Vilhena, state of Rondônia, Brazil	−12.7501°	−060.1272°	Bernarde et al. 2012
<i>Drepanoides anomalus</i>	Municipality of Espigão do Oeste, state of Rondônia, Brazil	−11.5000°	−060.6667°	Bernarde and Abe 2006
<i>Drepanoides anomalus</i>	Municipality of Pimenta Bueno, state of Rondônia, Brazil	−11.673°	−061.193°	Yuki et al. 1999
<i>Drepanoides anomalus</i>	Municipality of Porto Velho, state of Rondônia, Brazil	−08.7320°	−063.9002°	Bernarde et al. 2012
<i>Drepanoides anomalus</i>	Municipality of São Miguel do Guaporé, state of Rondônia, Brazil	−11.505°	−063.580°	Vanzolini 1986
<i>Drepanoides anomalus</i>	Municipality of Cacoal, state of Rondônia, Brazil	−11.4274°	−061.4674°	Turci and Bernarde 2008
<i>Drepanoides anomalus</i>	Forest of Moa River, municipality of Cruzeiro do Sul, state of Acre, Brazil	−07.6233°	−072.7953°	Bernarde et al. 2013
<i>Drepanoides anomalus</i>	Riozinho da Liberdade Extractive reserve, municipality of Tarauaca, state of Acre, Brazil	−07.9556°	−072.0769°	Bernarde et al. 2011
<i>Drepanoides anomalus</i>	Manu National Park, Peru	−12.0606°	−071.8645°	Catenazzi et al. 2013
<i>Drepanoides anomalus</i>	La Paz, Sorata, Bolivia	−15.7833°	−068.6667°	Fugler et al. 1995
<i>Drepanoides anomalus</i>	Scheffer Farm, Ituxi river, state of Amazonas, Brazil	−08.1159°	−065.4300°	Ávila-Pires et al. 2009
<i>Drepanoides anomalus</i>	Kaw Mountain, Guiana Francesa	−04.5512°	−052.1525°	Vacher et al. 2002
<i>Drepanoides anomalus</i>	Crique Gabaré, Guiana Francesa	−03.9083°	−051.8158°	Vacher et al. 2002
<i>Drepanoides anomalus</i>	Cachimbo Range, municipality of Novo Progresso, state of Pará, Brazil	−08.9186°	−055.8350°	Franca et al. 2006
<i>Drepanoides anomalus</i>	Las Piedras Province, Peru	−12.0560°	−069.6598°	Crnobrna, et al. 2016
<i>Drepanoides anomalus</i>	Municipality of Porto Walter, state of Acre, Brazil	−08.2973°	−072.8508°	Fonseca et al. 2019
<i>Drepanoides anomalus</i>	Hydroelectric Plant of Santo Antônio, Madeira River, state of Rondônia, Brazil	−08.8507°	−064.0125°	Fraga et al. 2014; Marçal et al. 2011
<i>Drepanoides anomalus</i>	National Forest of Caxiuanã, municipality of Melgaço, state of Pará, Brazil	−01.804°	−050.712°	Santos-Costa et al. 2015
<i>Drepanoides anomalus</i>	Municipality of Cruzeiro do Sul, state of Acre, Brazil	−07.6623°	−072.6843°	Silva et al. 2010
<i>Drepanoides anomalus</i>	Provincia Petrolífera de Urucu, municipality of Coari, state of Amazonas, Brazil	−04.8853°	−065.3498°	Prudente et al. 2010
<i>Drepanoides anomalus</i>	National Forest of Saracá-Taquera, state of Pará, Brazil	−01.6537°	−056.6306°	Morato et al. 2014
<i>Drepanoides anomalus</i>	National Forest of Trairão, state of Pará, Brazil	−04.5758°	−055.4039°	Mendes-Pinto et al. 2011
<i>Drepanoides anomalus</i>	Northwestern limit of Amazonica Basin, Guiana	−60.5679°	−060.7507°	Hoogmoed 1982
<i>Drepanoides anomalus</i>	Cuzco Amazonico, Madri de Dios, Peru	−11.6797°	−070.5852°	Duellman and Salas 1991
<i>Drepanoides anomalus</i>	Paramaribo, Surinam	05.800°	−056.2044°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Plantation Peperpot, Surinam	05.7667°	−055.1331°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	New River, Surinam	01.9330°	−056.6264°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	National Park Virua, state of Roraima, Brazil	01.2793°	−060.9889°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Cucui, state of Amazonas, Brazil	01.1985°	−066.8355°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Serra do Navio, state of Amapá, Brazil	00.896°	−052.002°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of São Gabriel da Cachoeira, state of Amazonas, Brazil	00.136°	−067.097°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Santa Isabel, state of Amazonas, Brazil	00.1263°	−068.9474°	Nogueira et al. 2019

Species	Locality	Latitude	Longitude	Reference
<i>Drepanoides anomalus</i>	Reserva de Produccion Faunistica Cuyabeno, Estacion Cientifica (PUCE), Sucumbios, Ecuador	−00.001°	−076.175°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Coop Los Angeles, Sucumbios, Ecuador	−00.0266°	−077.1060°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Puerto Rodrigues, Putumayo, Ecuador	−00.742°	−075.452°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Parroq. San Sebastian de Coca, Comuna Juan Pablo II, Rio Punino, Orellana, Ecuador	−00.278°	−077.340°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Parque Nacional Yasuni, Orellana, Ecuador	−00.473°	−076.575°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Taracoa, Orellana, Ecuador	−00.490°	−076.772°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Bosque Aluvial, Comunidad de Guiyero, Ecuador	−00.6246°	−076.4944°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Parque Nacional Yasuni, Napo, Ecuador	−00.654°	−076.452°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Cachoeira do Arari, state of Pará, Brazil	−01.0114°	−048.9633°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Viseu, state of Pará, Brazil	−01.1967°	−046.1400°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Santa Luzia do Pará, state of Pará, Brazil	−01.202°	−046.143°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Tiguno River, Bataburo Lodge, Pastaza, Ecuador	−01.250°	−076.666°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Vall-de-Caes, Marex, municipality of Belém, state of Pará, Brazil	−01.3838°	−048.4835°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Alrededores de Villano, Comunidad Tarangaro, Unidad 1, Pastaza, Ecuador	−01.394°	−077.382°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Alrededores de Villano, Comunidad Tarangaro, Unidad 2, Pastaza, Ecuador	−01.394°	−077.385°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Alrededores de Villano, Campamento Petrolero de AGIP, Villano B Sendero Tuberias, pastaza, Ecuador	−01.452°	−077.442°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Alrededor de Villano, campamento Petrolero de AGIP, Villano B-II, cerca de la Unidad 1, Pastaza, Ecuador	−01.454°	−077.441°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Campus of research MPEG, municipality of Belém, state of Pará, Brazil	−01.4619°	−048.4599°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Alrededores de Villano, Campamento petrolero AGIP, K10 Unidad 1, Pastaza, Ecuador	−01.476°	−077.532°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Porto Trombetas, municipality of Oriximiná, state of Pará, Brazil	−01.4833°	−056.3833°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Melgaço, state of Pará, Brazil	−01.8044°	−050.7122°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Enseada, municipality of São João de Pracajuba, state of Pará, Brazil	−01.8167°	−051.333°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Caquajo, municipality of São João de Pracajuba, state of Pará, Brazil	−01.9167°	−051.3833°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Mojuá, municipality of São João de Pracajuba, state of Pará, Brazil	−01.9167°	−051.3833°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Portel, state of Pará, Brazil	−01.9428°	−050.8211°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Montalvo (Andoas), Pastaza, Ecuador	−02.100°	−076.248°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Juruti, state of Pará, Brazil	−02.1522°	−056.0922°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Novo Airão, state of Amazonas, Brazil	−02.6333°	−060.9333°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Vitória do Xingú, state of Pará, Brazil	−02.8667°	−052.0000°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Gral. Leonidas Plaza Gutierrez (Limon), Napinaza, Quebrada rio Napinaza Morona Santiago, Ecuador	−02.922°	−078.407°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Careiro da Varzea, state of Amazonas, Brazil	−03.221°	−059.826°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Tucuruí, state of Pará, Brazil	−03.7661°	−049.6725°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Coari, state of Amazonas, Brazil	−04.085°	−063.141°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Porto Urucu, state of Amazonas, Brazil	−04.0850°	−063.1414°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Itaituba, state of Pará, Brazil	−04.2761°	−055.9836°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Resex Rio Iriri, Roncador, state of Pará, Brazil	−04.4369°	−053.6790°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Floa do Trairão, municipality of Ruropolis, state of Pará, Brazil	−04.5756°	−055.4037°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Floa do Tapirape Aquiri, municipality of Marabá, state of Pará, Brazil	−05.5829°	−050.3996°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Parauapebas, state of Pará, Brazil	−06.0667°	−049.9000°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Pera Dam, municipality of Carajás, state of Pará, Brazil	−06.0675°	−049.9022°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Piaçarra, state of Pará, Brazil	−06.4333°	−048.8667°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Novo Aripuana, state of Amazonas, Brazil	−06.744°	−060.461°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Resex Canutama, municipality of Canutama, state of Amazonas, Brazil	−06.8213°	−064.6728°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Vila Ecológica Céu do Juruá, municipality of IPIXUNA, state of Amazonas, Brazil	−06.8667°	−071.2000°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Novo Progresso	−07.1478°	−055.3811°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Labrea, state of Amazonas, Brazil	−07.259°	−064.799°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Ituxi River, state of Amazonas, Brazil	−07.5368°	−066.3794°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Madeira River, village of Mutum, state of Amazonas, Brazil	−08.5681°	−063.6850°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Apiacas, state of Mato Grosso, Brazil	−08.7529°	−057.8272°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Jamari River, municipality of Porto Velho, state of Roraima, Brazil	−08.762°	−063.904°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Hydroelectric Plant of Jirau, municipality of Porto Velho, state of Roraima, Brazil	−09.3311°	−064.7344°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Jacareacanga, state of Pará, Brazil	−09.3667°	−056.7167°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Cotriguaçu, state of Mato Grosso, Brazil	−09.5141°	−058.6786°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Alta Floresta, Mato Grosso, Brazil	−09.8756°	−056.0861°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Parque Estadual Guajara-Mirim, state of Roraima, Brazil	−10.7828°	−065.3394°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Claudia, state of Mato Grosso, Brazil	−11.4462°	−055.0494°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Brasnorte, state of Mato Grosso, Brazil	−12.4251°	−057.9950°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	La Paz, Iturralde, Ixiamas, Serrania Tequeje, Bolivia	−13.7167°	−068.2167°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	La Paz, Franz Tamayo, Apolo, Chalalan, Bolivia	−14.4246°	−067.9207°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Santa Cruz, Velasco, San Ignacio, Bolivia	−14.75°	−061.00°	Nogueira et al. 2019
<i>Drepanoides anomalus</i>	Municipality of Vale de São Domingos, state of Mato Grosso, Brazil	−15.0725°	−058.5744°	Nogueira et al. 2019

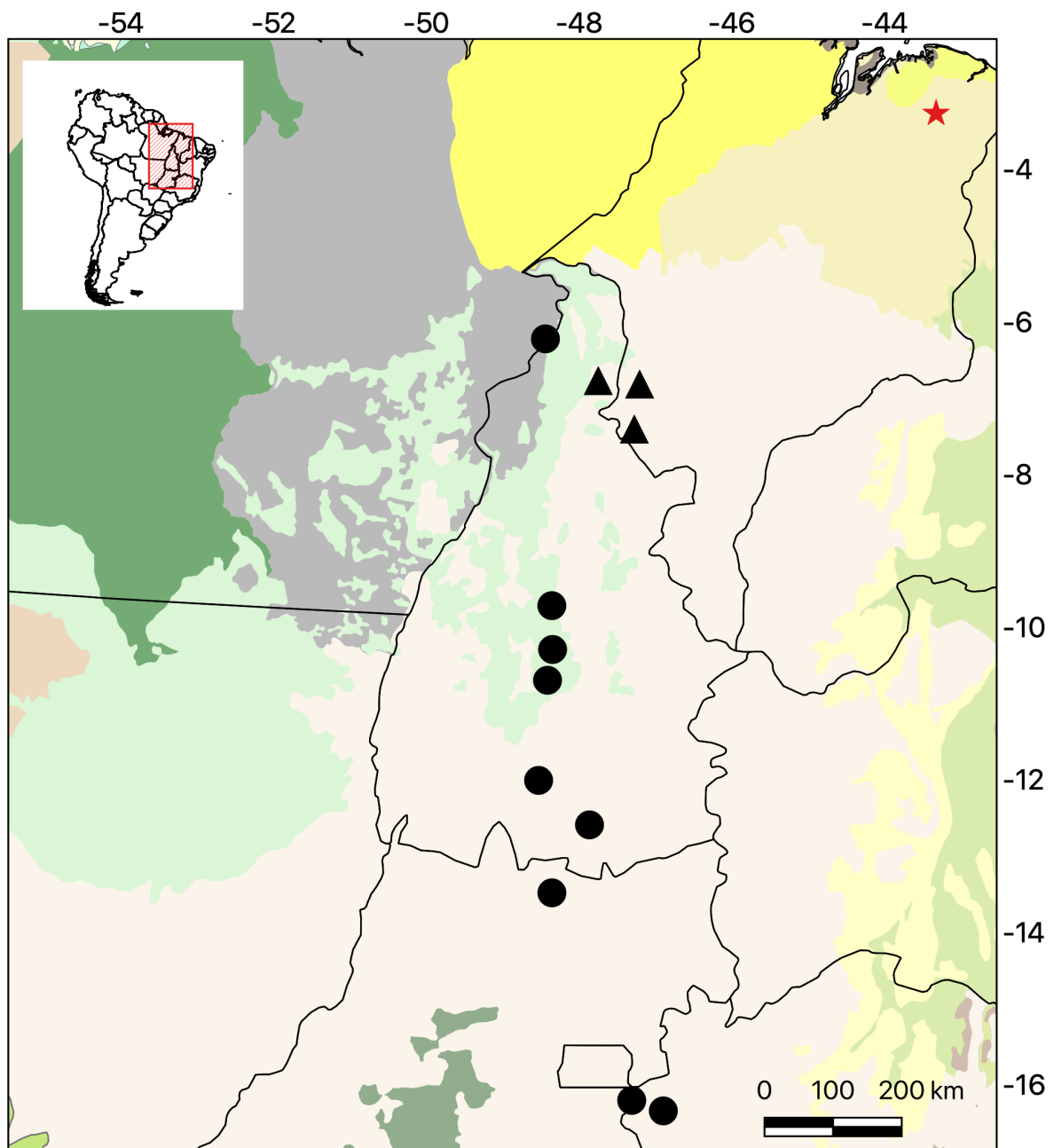


Figure 1. Distribution of *Trilepida fuliginosa* in Brazil (MPEG 21523). Symbols: black circles: literature records; black triangle mark: literature records from Prudente et al. (2019), with identification not confirmed by TBG; red star: new record in Santo Amaro Farm, municipality of Urbano Santos, state of Maranhão (MPEG 21523). Ecoregions with point occurrence according to Dinerstein et al. (2017): Maranhão; Cerrado; Mato Grosso tropical dry forests; Xingú-Tocantins-Araguaia moist forest.

043.4164°W; 41 m a.s.l.; 08 Feb. 2003; Cláudia M. Maia & Fabrícia L. Brito leg.; MPEG 21523.

Identification. We identified the specimen (MPEG 21523; Fig. 2) following Passos et al. (2006), based on the diagnostic characters: 14 midbody rows; 10 midtail rows; 207 middorsal scales (excluding the caudal spine); 188 mid-ventral scales; 14 subcaudal scales (excluding the caudal spine); 2+1 supralabials, no supralabials contacting supraocular; 5 infralabials. The color in preservative along seven dorsal scale rows is dark brown; ventrally, the specimen is cream-colored along the other seven scale rows. The lower portion of the rostral scale and supralabial border is cream-colored. Our photographs,

and the pholidosis of the specimen, were also verified by Roberta R. Pinto who confirmed the identification.

Drepanoides anomalus (Jan, 1863)

Figures 3, 4

New record. Material examined. BRAZIL • 1 ♀, 468 mm SVL, 137 mm CL, TL/CL 4.61; state of Maranhão, Carolina, Estreito hydroelectric plant; 07.1588°S, 047.7241°W; 167 m a.s.l.; 22 Sept. 2009; Carlos E.D. Cintra. leg. (field number: EDR 456); MPEG 24157.

Identification. We identified the specimen (MPEG 24157; Fig. 4) following Peracca (1896) and Peters and Orejas-Miranda (1970), based on the diagnostic characters:

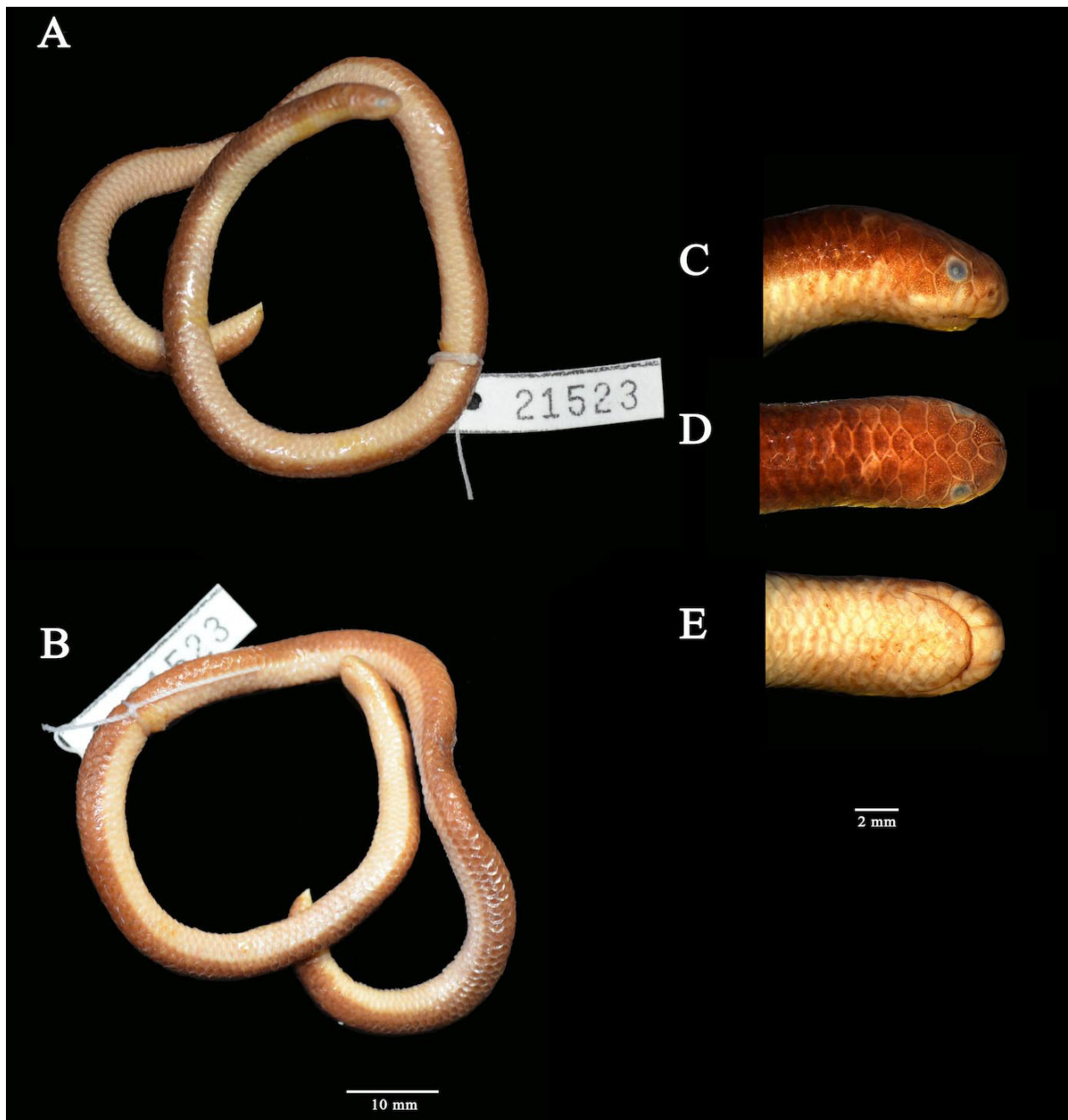


Figure 2. *Trilepida fuliginosa* (MPEG 21523). **A.** Dorsal view of the body. **B.** Ventral view of the body. **C.** Lateral head view. **D.** Dorsal head view. **E.** Gular region view. Photographs by TBG.

dorsal smooth in 15-15-15 rows; 170 ventral scales; 72 paired subcaudals; cloacal scale single; seven supralabials on both sides of the head with the third and fourth supralabial scales contacting the orbit; seven infralabials on both sides, first to fourth contacting the first pair of chin shields, fourth contacting the second pair of chin shields, first chin shield length 3.69 mm, second chin shield length 2.66 mm, temporals 2+2, one preocular and two postoculars on both sides of the head, loreal plate absent, jaw tooth with no trace of closed canal (aglyphous), and head length, width and height 17.61 mm, 10.64 mm, and 7.47 mm, respectively. After preservation in 70% ethanol, the head is black except on the border of supralabials, which is cream-colored; neck with an irregular white-collar one scale long, followed by a black

collar eight scales long; gular region uniformly cream-colored; dorsum beige with small spots in the posterior portion of each dorsal scale; ventrum uniformly cream-colored.

Discussion

The material examined herein represent the first records of *Trilepida fuliginosa* and *Drepanoides anomalus* in Maranhão. The specimen of *T. fuliginosa* came from the open landscapes of the Maranhão Babaçu Forests ecoregion (according to Dinerstein et al. 2017) and the Cerrado biome according to IBGE (2019b). This record represents the northernmost documented locality for this species, nearly 662 km in a straight line from the

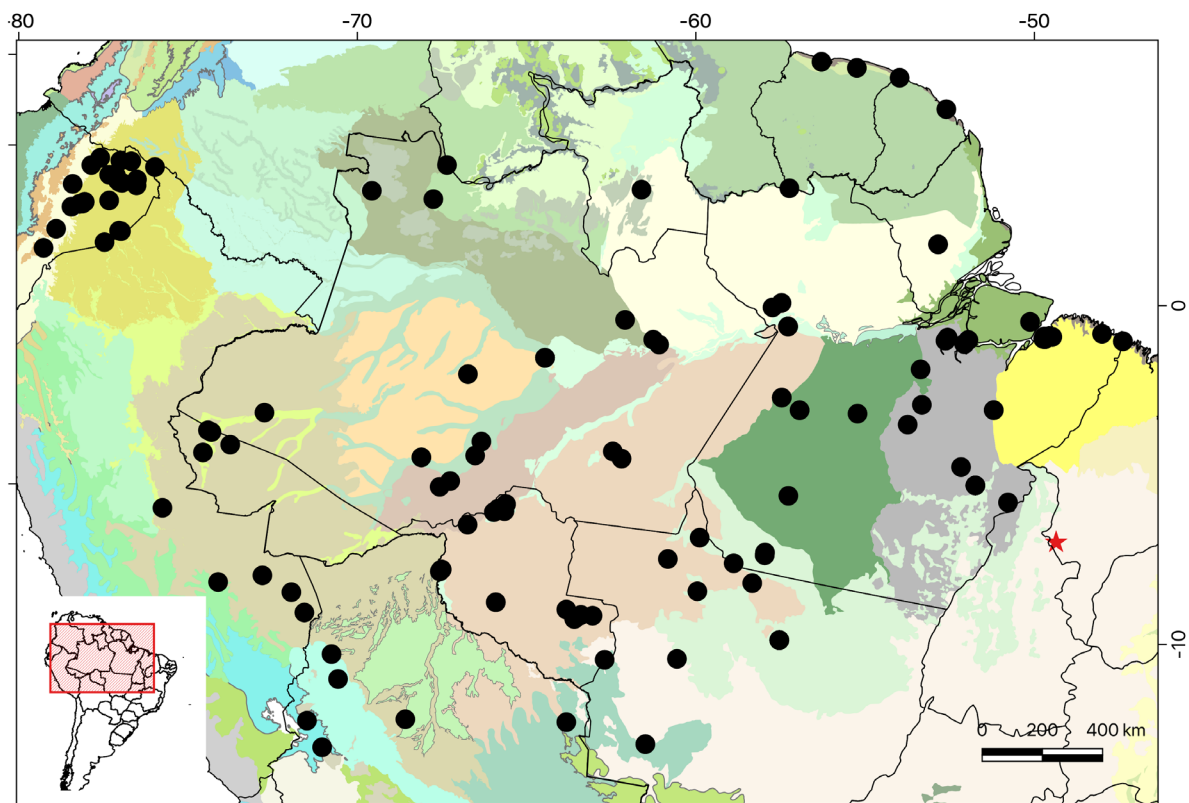


Figure 3. Distribution of *Drepanoides anomalus* in Brazil (MPEG 24157). Symbols: black circles: literature records; black question mark: literature records but with identification of the species not confirmed; red star: new record in Municipality of Carolina, Estreito Hydroelectric Plant, state of Maranhão (MPEG 21523). Ecoregions with point occurrence according to Dinerstein et al. (2017): Tocantins-Pindaré moist Forest; Cerrado; Xingú-Tocantins-Araguaia moist forest; Tapajós-Xingú moist forest; Mato Grosso tropical dry forest; Madeira-Tapajós moist forest; Uatumbá-Trombetas moist forest; Purus-Madeira moist forest; Jurus-Purus moist forest; Southwest Amazon moist forest; Central Andean wet Puna; Napo moist forest; Eastern Cordillera real montane forest; Amazon-Orinoco Southeastern Caribbean mangroves.

nearest previously known occurrence at São Geraldo do Araguaia, Pará. The specimen of *D. anomalus* also came from the open landscapes of the Cerrado biome (Dinerstein et al. 2017; IBGE 2019b) and is the easternmost occurrence of the species. This specimen was misidentified and was previously reported as *Phalotris labiomaculatus* by Hamdan et al. (2013). The record presented here extends the distribution of *D. anomalus* by 203 km from Piçarra, Pará.

Both new occurrences are within areas in southern Maranhão that are under strong anthropogenic threat due to deforestation (Myer et al. 2000; Mittermeier et al. 2005). This area in southern Maranhão is recognized as a priority for biodiversity conservation, especially for amphibians and reptiles (MMA 2007).

The new records suggest that these species are more widely distributed than previously thought. The fact that these species are just now being recorded in Maranhão reinforces the lack of herpetological research and researchers in the state. Approximately 103 species of snakes are estimated to occur in Maranhão (Costa and Bérnills 2018; Guedes et al. 2018). Of these, only six species are scolecophidian snakes belonging to three families that are undersampled and poorly known in the Neotropics (Guedes et al. 2018). On the other hand, the family Dipsadidae is the most species-rich in Brazil, and

in Maranhão there are approximately 45 species (Guedes et al. 2018; Costa and Bérnills 2018).

Scolecophidian bring together the thinnest and smallest species of snakes with complex taxonomy (Passos et al. 2006; Centeno et al. 2010; Graboski et al. 2015). One species of the family Anomalepididae [(*Liotyphlops ternetzii* (Boulenger, 1896))], three species of Typhlopidae [(*Amerotyphlops brongersmianus* (Vanzolini, 1976), *A. paucisquamus* (Dixon & Hendricks, 1979), and *A. reticulatus* (Linnaeus, 1758))], and two species of Leptotyphlopidae (*Trilepida brasiliensis* and *T. fuliginosa*) occur in Maranhão (Guedes et al. 2018; Costa and Bérnills 2018; this study). *Trilepida fuliginosa* is distinguished from all species of Typhlopidae and Anomalepididae in Maranhão in having 14 midbody rows (versus 16 in *A. brongersmianus*, 18 in *A. paucisquamus* and *A. reticulatus*, and 22–24 in *L. ternetzii*) (Centeno et al. 2010; Graboski et al. 2015); *T. fuliginosa* differs from *T. brasiliensis* in having a supraocular scale (versus absent in *T. brasiliensis*) and in the absence of fused caudals on the tip of the tail (versus present in *T. brasiliensis*) (Pinto and Curcio 2011).

Only two species in the Maranhão, *Apostolepis cearensis* Gomes, 1915 and *Phalotris labiomaculatus* Lema, 2002, are similar to *D. anomalus* in their pholidosis (15-15-15) and general color pattern in preservative.

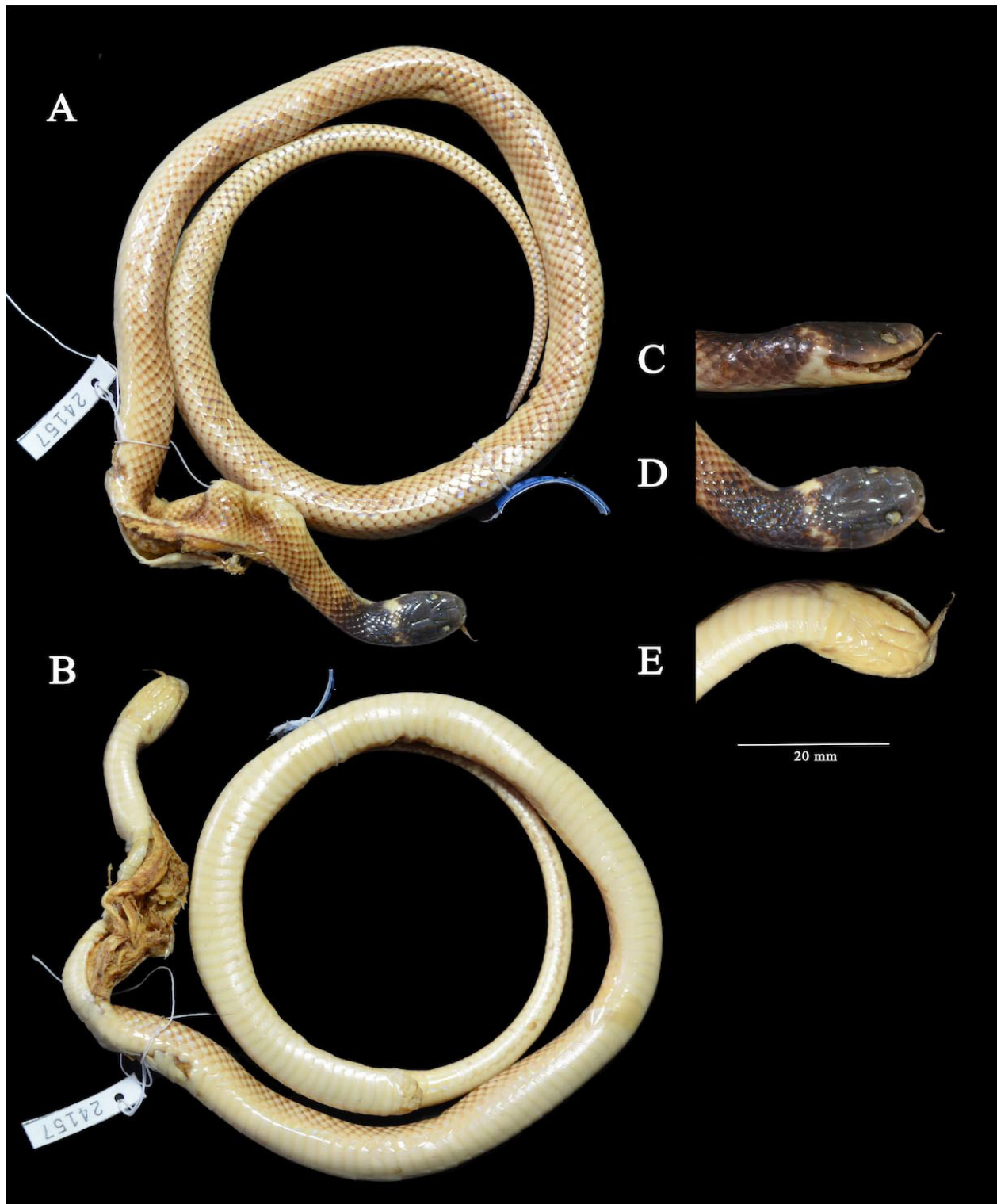


Figure 4. *Drepanoides anomalus* (MPEG 24157). **A.** Dorsal view of the body. **B.** Ventral view of the body. **C.** Lateral head view. **D.** Dorsal head view. **E.** Gular region view. Photographs by TBG.

Drepanoides anomalus differ from both in having no sulcate jaw tooth (aglyphous) versus opisthoglyphous dentition of the others (Peters and Orejas-Miranda 1970). The tip of the tail in *Apostolepis cearensis* is black, and, along with *P. labiomaculatus*, the eye is reduced; both characteristics are absent in *D. anomalus* (Peters and Orejas-Miranda 1970; Hamdan et al. 2013).

Considering the scarcity of information on the snake fauna in the north-central Brazil, these new records show

the importance of natural history collections in preserving biodiversity data. Occurrence records are basis for understanding distribution patterns of the Earth's biodiversity over time. The publication of new distributional records can and provide quality data to update species' geographic ranges, assess phylogenetic diversity and endemism, and contribute knowledge that can identify areas of priority for conservation (Guedes et al. 2018; Azevedo et al. 2020).

The natural landscapes of Maranhão has been strongly transformed by the expansion of agropastoral activities and an increase in human-caused forest fires (INPE 2019). New information on the composition and distributions of species can contribute to regional strategies for biological conservation, and our results are part of an ongoing project to gather information on the snake fauna and its distribution in Maranhão.

Acknowledgements

We are grateful to Ana Lucia Prudente for allowing access to the specimens housed in the herpetological collection of the Museu Paraense Emílio Goeldi. We thank João Fabrício Sarmiento and Jéssica San Martin for their assistance during the examination and photographing of the specimens. TBG thanks the Universidade Estadual do Maranhão for the Senior Researcher fellowship. AQ thanks the Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão. PS thanks the Universidade Estadual do Maranhão for the master's degree scholarship. B.H. thanks the Instituto Vital Brazil and Conselho Nacional de Desenvolvimento Científico e Tecnológico for the financial support.

Authors' Contributions

TBG examined the specimens, wrote the draft, and the figures and table; AQ and PS performed a review of the literature for occurrence data; BH assisted TBG in the whole process, especially in the preparation of the figures and the draft of the manuscript; BH assisted TBG with the identification; all authors revised the manuscript.

References

- Ab'Saber AN (1960) Contribuição à geomorfologia do estado do Maranhão. *Notícia Geomorfológica* 3 (5): 35–45.
- Andrade HMO (2010) Diversidad de la Herpetofauna en la Centro Amazonia de Ecuador. MSc dissertation, Instituto de Ecología A.C., Veracruz, Mexico, 150 pp.
- Avila-Pires TCS (1995) Lizards of Brazilian Amazonia (Reptilia: Squamata). *Zoologische Verhandelingen* 299 (1): 1–706.
- Avila-Pires TCS, Vitt LJ, Sartorius SS, Zani PA (2009) Squamata (Reptilia) from four sites in southern Amazonia, with a biogeographic analysis of Amazonian lizards. *Boletim do Museu Paraense Emílio Goeldi de Ciências Naturais* 4 (2): 99–118.
- Avila R, Kawashita-Ribeiro RA (2011) Herpetofauna of São João da Barra Hydroelectric Plant, state of Mato Grosso, Brazil. *Check List* 7 (6): 750–755. <http://doi.org/10.15560/11014>
- Azevedo JAR, Guedes TB, Nogueira CC, Passos P, Sawaya RJ, Prudente ALC, Barbo FE, Strüssmann C, Franco FL, Arzamendia V, Giraudo AR, Argôlo, AJS, Jansen M, Zaher H, Tonini JFR, Fauryby S, Antonelli A (2020) Museums and cradles of diversity are geographically coincident for narrowly distributed Neotropical snakes. *Ecography* 43: 328–339. <https://doi.org/10.1111/ecog.04815>
- Barreto L, Ribeiro LES, Nascimento MC (2011) Dominance in snakes. In: Martins MB, Oliveira GT (Eds) *Amazônia maranhense: diversidade e conservação*. Museu Paraense Emílio Goeldi, Belém, 195–202.
- Barros MC (2012) Biodiversidade na Área de Proteção Ambiental Municipal do Inhamum. Editora UEMaranhão, São Luís, 142 pp.
- Bernarde OS, Abe AS (2006) A snake community at Espigão do Oeste, Rondônia, southwestern Amazon, Brazil. *South American Journal of Herpetology* 1 (2): 102–113. [https://doi.org/10.2994/1808-9798\(2006\)1\[102:ASCAED\]2.0.CO;2](https://doi.org/10.2994/1808-9798(2006)1[102:ASCAED]2.0.CO;2)
- Bernarde OS, Albuquerque S, Barros TO, Turci LCB (2012) Serpentes do estado de Rondônia, Brasil. *Biota Neotropica* 12 (3): 1–30. <http://doi.org/10.1590/S1676-06032012000300018>
- Bernarde OS, Albuquerque S, Miranda DB, Turci LC (2013) Herpetofauna da floresta do baixo rio Moa em Cruzeiro do Sul, Acre – Brasil. *Biota Neotropica* 13 (1): 220–244. <https://doi.org/10.1590/S1676-06032013000100023>
- Boulenger GA (1896) Catalogue of the snakes in the British Museum (Natural History). Volume III., containing the Colubridæ (Opisthoglyphæ and Proteroglyphæ), Ambycephalidæ, and Viperidæ. Taylor and Francis, London, 727 pp. <https://doi.org/10.5962/bhl.title.8316>
- Catenazzi A, Lehr E, May RV (2013) The amphibians and reptiles of Manu National Park and its buffer zone, Amazon basin and eastern slopes of the Andes, Peru. *Biota Neotropica* 13 (4): 269–283.
- Centeno FC, Sawaya RJ, Germano VJ (2010) A new species of *Liotyphlops* (Serpentes: Anomalepididae) from the Atlantic Coastal Forest in southeastern Brazil. *Herpetologica* 66 (1): 86–91.
- Crnobrna B, Armes M, Williams HF (2016) *Drepanoides anomalus*. *Diet. Herpetological Review* 47 (3): 487.
- Costa HC, Bérnils RS (2018) Répteis do Brasil e suas unidades federativas: lista de espécies. *Herpetologia Brasileira* 1 (8): 11–48.
- Cunha OR, Nascimento FP (1978) Ofídios da Amazônia. X—As cobras da região leste do Pará. Museu Paraense Emílio Goeldi, Belém, 218 pp.
- Cunha OR, Nascimento FP (1993) Ofídios da Amazônia. As cobras da região leste do Pará. *Boletim do Museu Paraense de História Natural e Ethnographia* 9 (1): 1–96.
- Dinerstein E, Olson D, Joshi A, Vynne C, Burgess ND, Wikramanayake E, Hahn N, Palminteri S, Hedao P, Noss R, Hansen M, Locke H, Ellis EC, Jones B, Barber C, Hayes R, Kormos C, Martin V, Crist E, Sechrest W, Price L, Baillie JEM, Kindt R, Van Breugel P, Graudal L (2017) An ecoregion-based approach to protecting half the terrestrial realm. *Bioscience* 67 (6): 534–545. <http://doi.org/10.1093/biosci/bix014>
- Dixon JR, Hendricks FS (1979) The wormsnakes (family Typhlopidae) of the Neotropics, exclusive of the Antilles. *Zoologische Verhandelingen* 173: 1–39.
- Dowling HG (1951) A proposed standard system of counting ventrals in snakes. *British Journal of Herpetology* 1: 97–99.
- Duellman, WE (1978) The biology of an equatorial herpetofauna in Amazonian Ecuador. *Miscellaneous Publications of the University of Kansas* 65:1–352.
- Duellman WE, Salas AW (1991) Annotated checklist of the amphibians and reptiles of Cuzco Amazonico, Peru. *Occasional Papers of the Museum of Natural History, the University of Kansas* 143: 1–13.
- Fonseca WL, Silva, JD, Abegg AD, Rosa CM, Bernarde OS (2019) Herpetofauna of Porto Walter and surrounding areas, southwest Amazonia, Brazil. *Herpetology Notes* 12: 91–107.
- Fraga R, Stow AJ, Magnusson WE, Lima AP (2014) The costs of evaluating species densities and composition of snakes to assess development impacts in Amazonia. *Plos ONE* 9 (8): e105453. <https://doi.org/10.1371/journal.pone.0105453>
- França FGR, Mesquita DO, Colli GR (2006) A checklist of snakes from Amazonian savanas in Brazil, housed in the Coleção Herpetológica da Universidade de Brasília, with new distribution records. *Occasional Papers of the Sam Noble Oklahoma Museum of Natural History* 17: 1–13.
- Freitas MA, Vieira RS, Entiauspe-Neto OM, Sousa SO, Farias T, Sousa AG, Moura GJB (2017) Herpetofauna of the northwest Amazon forest in the state of Maranhão, Brazil, with remarks on the Gurupi Biological Reserve. *ZooKeys* 643: 141–155. <https://doi.org/10.1093/biosci/bix014>

- org/10.3897/zookeys.643.8215
- Fugler CM, Delariva I, Cabot J (1995) Herpetologica boliviana: una lista comentada de las serpientes de Bolivia con datos sobre su distribución. *Ecología en Bolivia* 24: 40–87.
- Gomes JF (1915) Contribuição para o conhecimento dos ofídios do Brasil. 1. Descrição de quatro espécies novas e um novo Gênero de opisthophthalmos. 2. Ophidios do Museu Rocha (Ceará). *Anais Paulistas de Medicina & Cirurgia* 4 (2): 121–129.
- Graboski R, Filho GAP, Silva AAA, Prudente ALC, Zaher H (2015) A new species of *Amerotyphlops* from northeastern Brazil, with comments on distribution of related species. *Zootaxa* 3920 (3): 443–452. <https://doi.org/10.11646/zootaxa.3920.3.3>
- Guedes TB, Sawaya RJ, Nogueira C (2014a) Biogeography, vicariance and conservation of snakes of the neglected and endangered Caatinga region, north-eastern Brazil. *Journal of Biogeography* 41: 919–931. <https://doi.org/10.1111/jbi.12272>
- Guedes TB, Nogueira C, Marques OAV (2014b) Diversity, natural history and geographic distribution of snakes in the Caatinga, Northeastern Brazil. *Zootaxa* 3863 (1): 001–093. <http://doi.org/10.11646/zootaxa.3863.1.1>
- Guedes TB, Sawaya RJ, Zizka A, Laffan S, Faurby S, Pyron RA, Bérnills RS, Jansen M, Passos P, Prudente ALC, Cisneros-Heredia DF, Braz HB, Nogueira C, Antonelli A (2018) Patterns, biases and prospects in the distribution and diversity of Neotropical snakes. *Global Ecology and Biogeography* 27: 14–21. <https://doi.org/10.1111/geb.12679>
- Hamdan B, Silva Jr NJ, Silva HLR, Cintra CED, Lema T (2013) Redescription of *Phalotris labiomaculatus* (Serpentes, Elapomorpha), with notes on the taxonomic boundaries within the nasutus group. *Zootaxa* 3693 (2): 182–188. <https://doi.org/10.11646/zootaxa.3693.2.4>
- Hoogmoed M (1982) Snakes of the Guianan Region. *Memorias do Instituto Butantan* 46: 219–254.
- IBGE (2019a) Instituto Brasileiro de Geografia e Estatística. <https://cidades.ibge.gov.br/brasil/ma/panorama> Accessed on: 2019-10-01.
- IBGE (2019b) Instituto Brasileiro de Geografia e Estatística. <https://www.ibge.gov.br/geociencias/informacoes-ambientais/15842-bio-mas.html?=&t=o-que-e> Accessed on: 2019-12-14.
- INPE (2019) Programa Queimadas do Instituto Nacional de Pesquisas Espaciais. <http://queimadas.dgi.inpe.br/queimadas/bdqueimadas/> Accessed on: 2019-12-14.
- Jan G (1863) Elenco sistematico degli ofidi descritti e disegnati per l'iconografia generale. A. Lombardi, Milano, 143 pp. <https://doi.org/10.5962/bhl.title.106683>
- Lehr E, Wallach V, Köhler G, Aguilar C (2001) New species of tricolor *Leptotyphlops* (Reptilia: Squamata: Leptotyphlopidae) from Central Peru. *Copeia* 2002: 131–136. [https://doi.org/10.1643/0045-8511\(2002\)002\[0131:NSOTLR\]2.0.CO;2](https://doi.org/10.1643/0045-8511(2002)002[0131:NSOTLR]2.0.CO;2)
- Lehr E (2002) Amphibien und Reptilien in Peru. *Natur und Tier-Verlag*, Münster, 220 pp.
- Lema T (2002) New species of *Phalotris* from northern Brazil with notes on the nasutus group (Serpentes: Elapomorpha). *Comunicações do Museu de Ciências e Tecnologia da PUCRS Serie Zoologia* 15 (2): 201–214.
- Linnaeus C (1758) *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Tomus I. Editio decima, reformata. Holmiae, Laurentii Salvii, 824 pp. <https://doi.org/10.5962/bhl.title.559>
- Marçal AS, Gomes IBSR, Coragem JP (2011) UHE Santo Antônio: guia das espécies de fauna resgatadas. *Scriba Comunicação Corporativa*, Porto Velho, 328 pp.
- Martins M, Oliveira ME (1998) Natural history of snakes in forests of the Manaus region, central Amazonia, Brazil. *Herpetological Natural History* 6 (2): 78–150.
- Martins MB, Oliveira TG (2011) Amazônia Maranhense: diversidade e conservação. *Museu Paraense Emílio Goeldi*, Belém, 328 pp.
- Mendes-Pinto TJ, Souza SM (2011) Preliminary assessment of amphibians and reptiles from Floresta Nacional do Trairão, with new snake record for the Pará state, Brazilian Amazon. *Salamandra* 47 (4): 199–206.
- Miranda J, Costa, JC, Rocha CFD (2012) Reptiles from Lençóis Maranhenses National Park, Maranhão, northeastern Brazil. *ZooKeys* 246: 51–68. <http://doi.org/10.3897/zookeys.246.2593>
- MMA (2007) Biodiversidade do Cerrado e Pantanal: áreas e ações prioritárias para conservação. Ministério do Meio Ambiente, Brasília, 540 pp.
- Mittermeier RA, Gil PR, Hoffmann M, Pilgrim J, Brooks, Mittermeier CG, Lamoreux J, Fonseca GAB (2005) Hotspots revisited: Earth's biologically richest and most endangered terrestrial ecoregions. *Cemex, Cidade do México*, 392 pp.
- Morato SAA, Calixto PO, Mendes LRLP, Gomes R (2014) Guia fotográfico de identificação da herpetofauna da Floresta Nacional de Saracá-Taquera, estado do Pará. *STCP Engenharia de Projetos Ltda., Curitiba*, 213pp.
- Myer N, Mittermeier RA, Mittermeier CG, Fonseca GAB, Kent J (2000) Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858. <https://doi.org/10.1038/35002501>
- Nogueira CC, Argôlo AJ, Arzamendia V, Azevedo JA, Barbo FE, Bérnills RS, Bolocho BE, Borges-Martins M, Brasil-Godinho M, Braz H, Buononato MA, Cisneros-Heredia DF, Colli GR, Costa HC, Franco FL, Giraud A, Gonzalez RC, Guedes T, Hoogmoed MS, Marques OAV, Montingelli GG, Passos P, Prudente ALC, Rivas GA, Sanchez PM, Serrano FC, Silva Jr NJ, Strüssmann C, Vieira-Alencar JPS, Zaher H, Sawaya RJ, Martins M (2019) Atlas of Brazilian snakes: verified point locality maps to mitigate the Wallacean shortfall in a megadiverse snake fauna. *South America Journal of Herpetology* 14: 1–274. <https://doi.org/10.2994/SAJH-D-19-00120.1>
- Passos P, Caramaschi U, Pinto RR (2006) Redescription of *Leptotyphlops kopepsi* Amaral, 1954, and a description of a new species of the *Leptotyphlops dulcis* group from Central Brazil (Serpentes: Leptotyphlopidae). *Amphibia-Reptilia* 27: 347–357. <https://doi.org/10.1163/156853806778190006>
- Peracca MG (1896) Sopra un nuovo genere ed una nuova specie di colubride áglifo dell'America meridionale. *Bollettino dei Musei di Zoologia e di Anatomia Comparata della Università di Torino* 11 (231): 1–7.
- Peters JA, Orejas-Miranda B (1970) Catalogue of the Neotropical Squamata: part I. Snakes. *United States National Museum Bulletin* 297: 1–347.
- Pinto RR, Curcio FF (2011) On the generic identity of *Siagonodon brasiliensis*, with the description of a new leptotyphlopoid from central Brazil (Serpentes: Leptotyphlopidae). *Copeia* 2011 (1): 53–63. <https://doi.org/10.1643/CH-09-119>
- Prudente ALC, Maschio GF, Santos-Costa MC, Feitosa DT (2010) Serpentes da Bacia Petrolífera de Urucu, Município de Coari, Amazonas, Brasil. *Acta Amazonica* 40 (2): 381–386. <https://doi.org/10.1590/S0044-59672010000200016>
- Prudente ALC, Ramos LAC, Silva TM, Sarmento JFM, Dourado ACM, Silva FM, Almeida PCR, Santos CRM, Sousa MPA (2019) Dataset from the snakes (Serpentes, Reptiles) collection of the Museu Paraense Emílio Goeldi, Pará, Brazil. *Biodiversity Data Journal* 7: e34013. <https://doi.org/10.3897/BDJ.7.e34013>
- Ribeiro-Júnior MA (2015a) Catalogue of distribution of lizards (Reptilia: Squamata) from the Brazilian Amazonia. I. Dactyloidae, Hoplocercidae, Iguanidae, Leiosauridae, Polychrotidae, Tropiduridae. *Zootaxa* 3983 (3): 1–110. <http://doi.org/10.11646/zootaxa.3983.1.1>
- Ribeiro-Júnior MA (2015b) Catalogue of distribution of lizards (Reptilia: Squamata) from the Brazilian Amazonia. II. Gekkonidae, Phyllodactylidae, Sphaerodactylidae. *Zootaxa* 3981 (1): 1–55. <http://doi.org/10.11646/zootaxa.3981.1.1>
- Ribeiro-Júnior MA (2016) Catalogue of distribution of lizards (Reptilia: Squamata) from the Brazilian Amazonia. III. Anguidae, Scincidae, Teiidae. *Zootaxa* 4205 (5): 401–430. <http://doi.org/10.11646/zootaxa.4205.5.1>

- Ribeiro-Júnior MA (2017) Catalogue of distribution of lizards (Reptilia: Squamata) from the Brazilian Amazonia. IV. Alopoglossidae, Gymnophthalmidae. Zootaxa 4269 (2): 151–196. <http://doi.org/10.11646/zootaxa.4269.2.1>
- Santos-Costa MC, Maschio GF, Prudente ALC (2015) Natural history of snakes from Floresta Nacional de Caxiuanã, eastern Amazonia, Brazil. Herpetology Notes 8: 69–98.
- Silva MV, Souza MB, Bernarde OS (2010) Riqueza e dieta de serpentes do Estado do Acre. Brasil. Revistas Brasileira de Zoociências 12 (2): 165–176.
- Silva Jr. NJ (1993) The snakes from Samuel Hydroelectric power plant and vicinity, Rondônia, Brazil. Herpetological Natural History 1 (1): 37–86.
- Turci LCB, Bernarde PS (2008) Levantamento herpetofaunístico em uma localidade no município de Cacoal, Rondônia, Brasil. Bioikos 22 (2): 102–108.
- Vacher JP, Dewynter M, Marty C, Blanc M (2002) New records for *Drepanoides anomalus* in French Guiana. Herpetozoa 13 (3/4): 133–135.
- Vanzolini PE (1976) *Typhlops brongersmianus*, a new species for *Typhlops brongersmai* Vanzolini, 1972, preoccupied (Serpentes, Typhlopidae). Papéis Avulsos de Zoologia 29 (24): 247.
- Vanzolini PE (1986) Levantamento herpetológico da área do estado de Rondônia sob influência da rodovia BR 364. CNPq, Brasília, 50 pp.
- Vidal N, Massary JC, Marty C (1998) Nouvelles espèces de serpents pour la Guyane française. Revue Française d'Aquariologie 25 (3–4): 131–134.
- Wallach V (2003) Scolecophidia miscellanea. Hamadryad 27: 222–240.
- Wallach V, Williams KL, Boundy J (2014) Snakes of the world: a catalogue of living and extinct species. CRC Press, London, 1257 pp.
- Yuki RN, Galatti U, Rocha RAT (1999) Contribuição ao conhecimento da fauna de Squamata de Rondônia, Brasil, com dois novos registros. Boletim do Museu Paraense Emílio Goeldi 15 (2): 181–193.