

Bothriopsis bilineata bilineata (Wied, 1821) (Serpentes: Viperidae): New records in the states of Amazonas, Mato Grosso and Rondônia, northern Brazil

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ABSTRACT: Although widely distributed in the Brazilian Amazonia, there are few published records of *Bothriopsis bilineata* in this region, with large gaps between them. This scarcity of reports of *B. bilineata* in nature may be caused by its arboreal habits, cryptic color, and a possible low density in many areas. Here we provide new registers of the subspecies *B. b. bilineata*, improving the knowledge of its distribution.

The South-American Palm Viper *Bothriopsis bilineata* (Wied, 1821) is distributed throughout the Amazon region of Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, French Guyana, and Brazil, also occurring in the eastern Brazilian Atlantic Forest (Campbell and Lamar 2004). Two subspecies are currently recognized: *B. b. bilineata* (Wied, 1821) and *B. b. smaragdina* (Hoge, 1966).

The nominal form is known from Venezuela, Guyana, Suriname, French Guyana and Brazil. In the Brazilian territory, it is reported from eastern Amazonia (Maranhão, Pará, Amapá and Roraima states) and the Atlantic Forest (from Bahia to Rio de Janeiro states) (Hoge 1966; Cunha 1967; Hoge and Romano-Hoge 1981; Cunha and Nascimento 1993; Campbell and Lamar 2004). Amaral (1978) asserts that the distribution of *B. bilineata* encompasses 'eastern, northeastern and central zones (from Pernambuco and vicinities, to Bahia, Espírito Santo, Goiás and Mato Grosso), extending to neighboring countries'. However, this author does not present accurate information, on which data they are based, and also does not consider subspecies of this taxon. In the Brazilian Atlantic Forest, *B. b. bilineata* is considered probably extinct in the state of Rio de Janeiro due to low population density and dependence of preserved forests and slopes (Rocha *et al.* 2000), vulnerable in Espírito Santo (Almeida *et al.* 2008) and data deficient in Minas Gerais (Fundação Biodiversitas 2007). The subspecies *B. b. smaragdina* inhabits the Amazonian forests of Bolivia, Peru, Ecuador, Colombia, southern Venezuela, and the Brazilian states of Acre, Amazonas and Rondônia (Hoge 1966; Silva-Jr. 1993; Campbell and Lamar 2004; Turci *et al.* 2009).

Species of *Bothriopsis* are not well represented in scientific collections, probably due to their arboreal habits, cryptic color pattern, and a possible low density in most areas where they occur (Campbell and Lamar 2004). In the present note, we give new information concerning the geographic distribution of *Bothriopsis bilineata bilineata*, with records of its occurrence for the Brazilian states of

Amazonas, Rondônia and Mato Grosso.

The new records were made during herpetofaunal studies in the states of Amazonas (Floresta Estadual de Tapauá, near the BR-319 highway, 06°39'49" S, 62°58'58" W), Rondônia (Fazenda Jaburi, municipality of Espigão do Oeste, 11°38'02" S, 60°43'51" W, and municipality of Cacoal, 11°28'00" S, 61°19'51" W), and Mato Grosso (Fazenda Maracatiá, municipality of Aripuanã, 10°09'32" S, 59°28'08" W). Specimens were identified based in characteristics presented by Hoge (1966) and Campbell and Lamar (2004). Voucher specimens were deposited in the herpetological collections of Museu de História Natural Capão da Imbuia (MHNCI 9586), Curitiba, Instituto Nacional de Pesquisas da Amazônia (INPA-H 27639), Manaus, and Museu de Zoologia João Moojen, Universidade Federal de Viçosa (MZUFV 1845), Viçosa, all in Brazil. Additional records were obtained from specimens deposited in the Herpetological Collection of Museu Paraense Emílio Goeldi (MPEG), Belém, Pará.

The specimens found by us in Amazonas and Mato Grosso (Figure 1) have vertical dark bars on the supralabials, a clear dark postocular stripe, and tan or reddish brown spots with black specks on a green dorsum, characters that separate *B. b. bilineata* from *B. b. smaragdina* (Hoge 1966; Campbell and Lamar 2004) (Figure 2). Campbell and Lamar (2004, p. 313, Figure 102) mistakenly present the illustrations of the side of the heads of the two subspecies reversed (102-A actually is *B. b. smaragdina* and 102-B is *B. b. bilineata*; see Hoge 1966, p. 165, Plate 1 – Figures 1 and 2 for the correct version).

Despite the fact that Amazonas is the largest state of Brazil, there are currently just four published records of *B. bilineata*: three of *B. b. smaragdina*, from the high Purus river (08°44' S, 67°49' W, type locality) and the municipalities of Benjamin Constant (04°39' S, 69°52' W) and São Gabriel da Cachoeira (00°49' N, 66°59' W) (Hoge 1966; Campbell and Lamar 2004); and one without subspecies designation from the INPA-WWF Reserve

(Campbell and Lamar 2004). It is important to note that this last record is just an expected occurrence, and *B. bilineata* was never collected there (Zimmerman and Rodrigues 1990). Thus, the present record of *B. b. bilineata* from Floresta Estadual de Tapauá, southeastern part of Amazonas can be considered the first of this subspecies for that state. The MPEG collection has a specimen from a second locality in Amazonas, Reserva de Desenvolvimento Sustentável Mamirauá (02°57' S, 64°52' W; MPEG 20513).

In Rondônia, there are records of *B. b. smaragdina* from Samuel Hydroelectric Power Plant (08°51' S, 63°25'

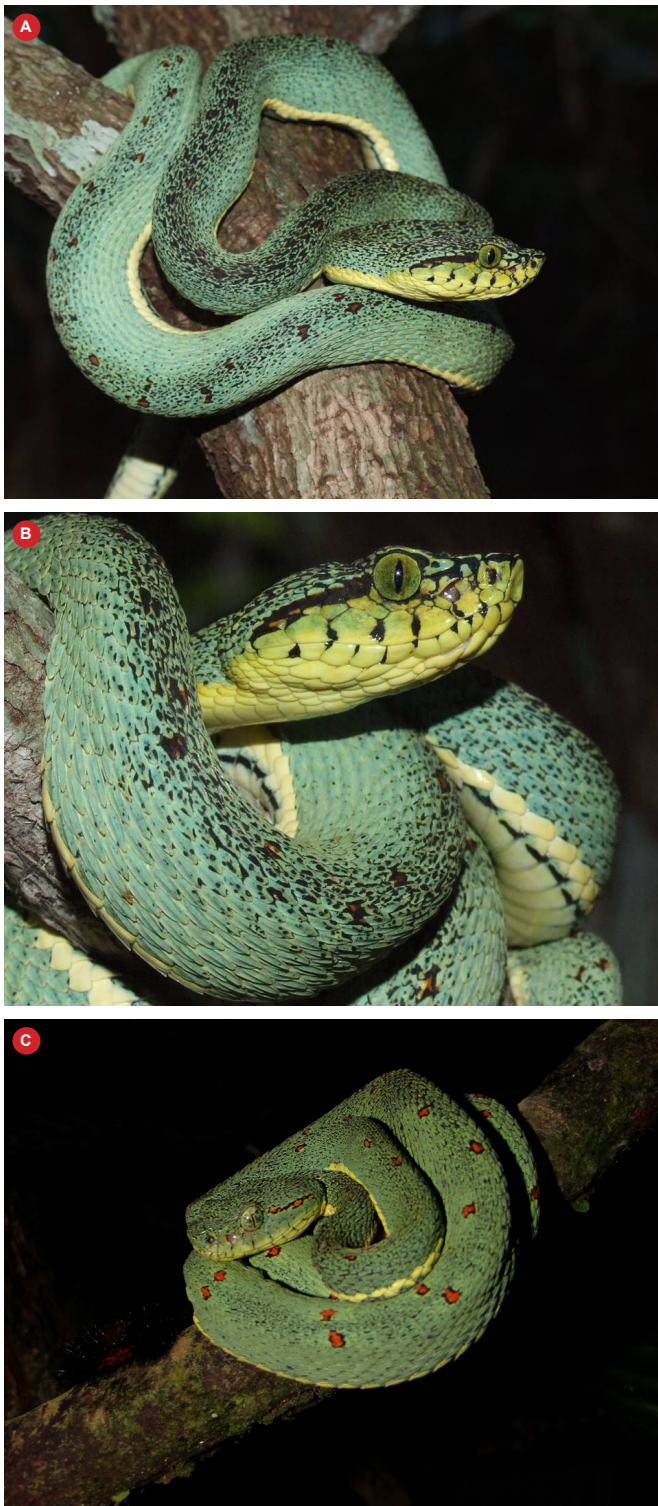


FIGURE 1. *Bothriopsis bilineata bilineata* from Floresta Estadual de Tapauá, Amazonas (A and B) and Fazenda Maracatiá, Aripuanã, Mato Grosso (C). Photos: Paulo S. Bernarde (A, B) and Henrique C. Costa (C).

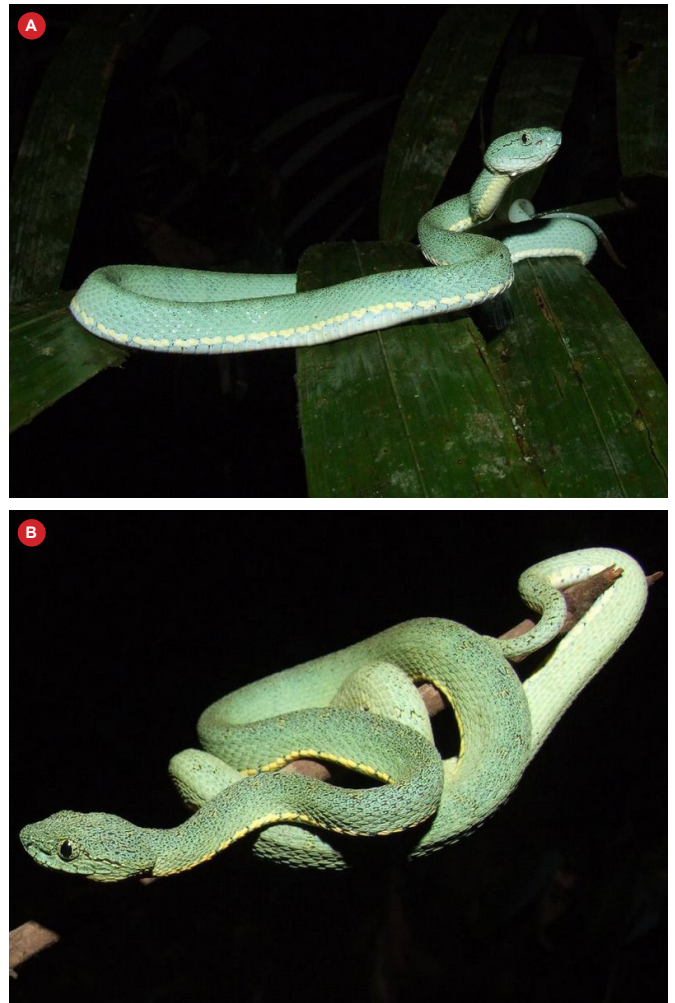


FIGURE 2. *Bothriopsis bilineata smaragdina* from Floresta do Baixo Rio Mõa, Acre. Photos: Paulo S. Bernarde.

W) (Silva-Jr 1993), and Parque Estadual Guajará-Mirim (11°41' S, 64°28' W) (Campbell and Lamar 2004). The MPEG collection, however, has two specimens of *B. b. bilineata* from Parque Estadual Guajará-Mirim (MPEG 19468, 19469), which lead us to believe that the presence of *B. b. smaragdina* in Guajará-Mirim (Campbell and Lamar 2004) may be a mistake. Therefore, this is the southernmost locality of occurrence of *B. b. bilineata* in Amazonia (Figure 3). There are also two reports of *B. bilineata* without subspecific designation to Espigão do Oeste (Bernarde and Abe 2006) and Cacoal (Turci and Bernarde 2008). Those areas were surveyed by one of us (PSB), and *B. b. bilineata* is actually the occurring subspecies.

Amaral (1978) cites the state of Mato Grosso within the geographic distribution of *B. bilineata*, without giving precise locality data. Additionally, the map presented by Campbell and Lamar (2004) has a dot in Mato Grosso (ca. 11°16' S, 58°50' W), without designation of subspecies. Therefore, the presence of *B. b. bilineata* in that state could not be really confirmed until now, and we consider Fazenda Maracatiá, in the municipality of Aripuanã, as the first locality with voucher record of this taxon for Mato Grosso.

Hoge and Romano-Hoge (1981) cite *B. b. bilineata* for the state of Maranhão, eastern Amazonia, without any locality information. Cunha and Nascimento (1993) do not consider this record, but report the snake from Bela Vista (01°18' S, 46°16' W), in the municipality of Viseu,

state of Pará, close to the Gurupi River, at the boundary with Maranhão. Although there are no confirmed records of *B. b. bilineata* in Maranhão, its occurrence there would be plausible.

The only published records of *B. bilineata* for the state of Amapá are based on the map of Campbell and Lamar (2004; *B. b. bilineata*) and a herpetofaunal survey by Lima (2008; no subspecies designated), both from Parque Nacional Montanhas do Tumucumaque (02°16' N, 52°26' W), on the boundaries of Brazil and French Guiana. We add a second locality record, from Serra do Navio (01°15' N, 52°09' W), based on a specimen from MPEG collection (MPEG 22850).

We also add a new record of *B. b. smaragdina* for Acre (municipality of Cruzeiro do Sul, 07°45' S, 72°22' W; voucher UFACF 3761, Coleção Herpetológica da Universidade Federal do Acre, Campus Floresta, Cruzeiro do Sul), close to the westernmost report of this subspecies in Brazil, at the Mõa River (07°37' S, 72°48' W) (Turci et al. 2009).

Large gaps in the current distribution of *B. b. bilineata* can be observed (Figure 3), probably as a result of low sampling efforts as well as the difficulty in finding these snakes in nature. However the species may not occur in certain localities (e.g., Martins and Oliveira, 1998 see below). Less than 50 years have passed since Cunha (1967) confirmed the presence of *B. b. bilineata* for

eastern Amazonia, in Benevides, state of Pará. Cunha and Nascimento (1993) also suggest that this is a rare species at eastern Pará, and Avila-Pires et al. (2010) do not found it during a series of inventories in the northern part of that state. *Bothriopsis bilineata* was never found during two large inventories in the state of Amazonas, a survey in Reserva Ducke, Manaus, and the flooding of Balbina Power Plant, municipality of Presidente Figueiredo (where hundreds of *Bothrops atrox* and 60 *Lachesis muta* were collected; Martins and Oliveira 1998). In Rondônia, during the flooding of Samuel Hydroelectric Power Plant, only four specimens of *B. b. smaragdina* were found (Silva-Jr. 1993), while in Espigão do Oeste, after almost two years of sampling, only one specimen was collected (Bernarde and Abe 2006). The same is observed in Mato Grosso. After eleven field trips to the municipality of Aripuanã, each one lasting about 10 days, only one *B. b. bilineata* was recorded (VASP and HCC pers. obs.); seven months later, in February 2011, we received photographs of two specimens found close to the site of the first record, road killed beside one another, but unfortunately not collected. Other inventories in Mato Grosso and Rondônia fail to report any specimen of *B. bilineata* (Amaral 1948; Vanzolini 1986; Nascimento et al. 1988). At the high Juruá River, state of Acre, *B. bilineata* was never found during a two years study inside the forests of Liberdade River (Bernarde et al. unpublished data). On the other hand population density of *B. bilineata*

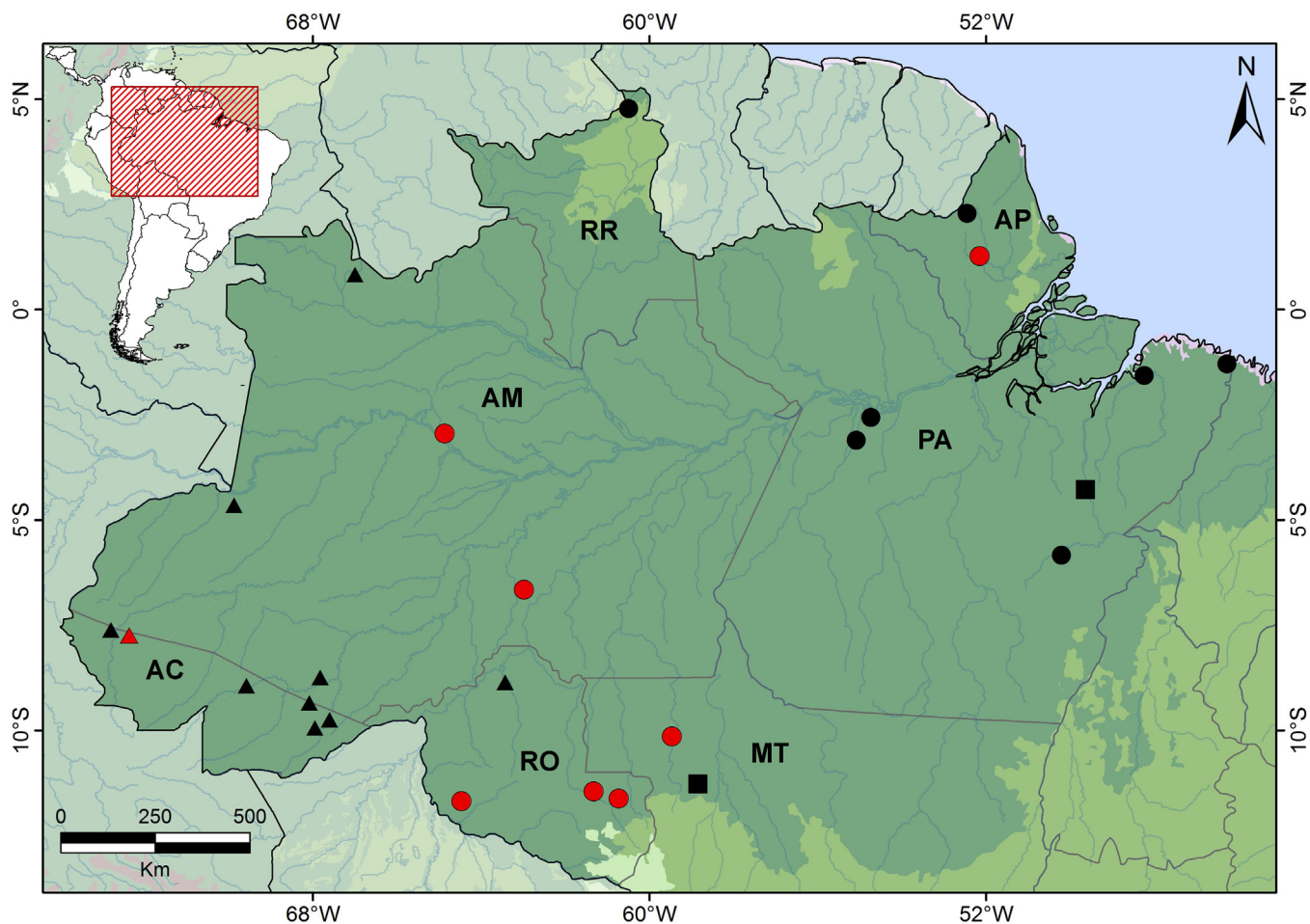


FIGURE 3. Known records of *Bothriopsis bilineata* in Brazilian Amazonia. Black symbols = Literature data (Hoge 1966; Cunha and Nascimento 1993; Silva-Jr. 1993; Silva-Jr. and Sites-Jr. 1995; Campbell and Lamar 2004; Turci et al. 2009; Silva et al. 2010). Red symbols = New records. Circles = *B. b. bilineata*. Triangles = *B. b. smaragdina*. Squares = Subspecies not identified, but possibly *B. b. bilineata*. AC = Acre, AM = Amazonas, AP = Amapá, MT = Mato Grosso, PA = Pará, RO = Rondônia, RR = Roraima. Map by Mário R. Moura.

may be high in certain localities: in the forests of the lower M \hat{o} a River, *B. b. smaragdina* was the most frequent pit viper (one snake found at each 32 hours; cf. Turci et al. 2009).

Based on our results, we can suggest that in the Brazilian Amazonia, *Bothriopsis bilineata bilineata* occurs from eastern Par \acute{a} to Amap \acute{a} , Roraima, northwestern Mato Grosso, southeastern and southwestern Rond \hat{o} nia, and central and southeastern Amazonas. On the other hand, *B. b. smaragdina* is present in western Amazonas, Acre,

and northern Rond \hat{o} nia (Figure 3; Table 1). The present paper improves our knowledge about the distribution of *Bothriopsis bilineata* in the Brazilian Amazonia. However, too many gaps still exist, some of them probably caused by poor sampling, making necessary the inventory of several areas, mainly in the western part of the region. The new records demonstrate a close proximity between the distributions of these subspecies. Additional studies are necessary to understand the distribution patterns found for these taxa in the Amazonian region.

TABLE 1. Locality records for *Bothriopsis bilineata bilineata* and *Bothriopsis bilineata smaragdina* in Brazilian Amazonia.

TAXA	LOCALITY, STATE	COORDINATES	REFERENCE
<i>B. b. bilineata</i>	Uiramut \acute{a} (?), RORAIMA	ca. 04 $^{\circ}$ 46' N, 60 $^{\circ}$ 29' W	Campbell and Lamar 2004
<i>B. b. bilineata</i>	Parque Nacional Montanhas do Tumucumaque, AMAP \acute{a}	02 $^{\circ}$ 16' N, 52 $^{\circ}$ 26' W	Campbell and Lamar 2004; Lima 2008
<i>B. b. bilineata</i>	Serra do Navio, AMAP \acute{a}	01 $^{\circ}$ 15' N, 52 $^{\circ}$ 09' W	This study (MPEG 22850)
<i>B. b. smaragdina</i>	S \acute{a} o Gabriel da Cachoeira, AMAZONAS	00 $^{\circ}$ 49' N, 66 $^{\circ}$ 59' W	Hoge 1966; Campbell and Lamar 2004
<i>B. b. bilineata</i>	Vis \acute{e} u (Bela Vista), PAR \acute{a}	01 $^{\circ}$ 18' S, 46 $^{\circ}$ 16' W	Cunha and Nascimento 1993; Campbell and Lamar 2004
<i>B. b. bilineata</i>	Benevides, PAR \acute{a}	01 $^{\circ}$ 34' S, 48 $^{\circ}$ 14' W	Cunha 1967; Campbell and Lamar 2004
<i>B. b. bilineata</i>	Santar \acute{e} m, PAR \acute{a}	02 $^{\circ}$ 34' S, 54 $^{\circ}$ 44' W	Campbell and Lamar 2004
<i>B. b. bilineata</i>	Reserva de Desenvolvimento Sustent \acute{a} vel Mamirau \acute{a} , AMAZONAS	02 $^{\circ}$ 57' S, 64 $^{\circ}$ 52' W	This study (MPEG 20513)
<i>B. b. bilineata</i>	Curu \acute{a} -Una, PAR \acute{a}	03 $^{\circ}$ 06' S, 55 $^{\circ}$ 04' W	Campbell and Lamar 2004
<i>B. bilineata</i> (without subspecies designation)	Tucuru \acute{f} , PAR \acute{a}	04 $^{\circ}$ 17' S, 49 $^{\circ}$ 38' W	Silva-Jr. and Sites 1995
<i>B. b. smaragdina</i>	Benjamin Constant, AMAZONAS	04 $^{\circ}$ 39' S, 69 $^{\circ}$ 52' W	Hoge 1966; Campbell and Lamar 2004
<i>B. b. bilineata</i>	Serra Norte, Caraj \acute{a} s, PAR \acute{a}	05 $^{\circ}$ 51' S, 50 $^{\circ}$ 12' W	Cunha and Nascimento 1993
<i>B. b. bilineata</i>	Floresta Estadual de Tapu \acute{a} , AMAZONAS	06 $^{\circ}$ 39'49" S, 62 $^{\circ}$ 58'58" W	This study (INPA-H 27639)
<i>B. b. smaragdina</i>	Floresta do Rio Moa, ACRE	06 $^{\circ}$ 37' S, 72 $^{\circ}$ 48' W	Turci et al. 2009
<i>B. b. smaragdina</i>	Cruzeiro do Sul, ACRE	7 $^{\circ}$ 45' S, 72 $^{\circ}$ 22' W	This study (UFACF 3761)
<i>B. b. smaragdina</i>	Alto Purus, AMAZONAS	08 $^{\circ}$ 44' S, 67 $^{\circ}$ 49' W	Hoge 1966
<i>B. b. smaragdina</i>	Samuel Hydroelectric Power Plant, ROND \hat{o} NIA	08 $^{\circ}$ 51' S, 63 $^{\circ}$ 25' W	Silva-Jr 1993
<i>B. b. smaragdina</i>	Alto Purus, ACRE	08 $^{\circ}$ 56' S, 69 $^{\circ}$ 34' W	Hoge 1966; Campbell and Lamar 2004
<i>B. b. smaragdina</i>	Bujari, ACRE	09 $^{\circ}$ 20' S, 68 $^{\circ}$ 04' W	Silva et al. 2010
<i>B. b. smaragdina</i>	Porto Acre, ACRE	09 $^{\circ}$ 45' S, 67 $^{\circ}$ 35' W	Silva et al. 2010
<i>B. b. smaragdina</i>	Rio Branco, ACRE	09 $^{\circ}$ 56' S, 67 $^{\circ}$ 57' W	Silva et al. 2010
<i>B. b. bilineata</i>	Fazenda Maracati \acute{a} , Aripuan \acute{a} , MATO GROSSO	10 $^{\circ}$ 09'32" S, 59 $^{\circ}$ 28'08" W	This study (MZUFV 1845)
<i>B. bilineata</i> (without subspecies designation)	(?), MATO GROSSO	ca. 11 $^{\circ}$ 16' S, 58 $^{\circ}$ 50' W	Campbell and Lamar 2004
<i>B. b. bilineata</i>	Cacoal, ROND \hat{o} NIA	11 $^{\circ}$ 28'00" S, 61 $^{\circ}$ 19'51" W	Turci and Bernarde 2008 (without subspecies designation); This study
<i>B. b. bilineata</i>	Fazenda Jaburi, Espig \hat{a} o do Oeste, ROND \hat{o} NIA	11 $^{\circ}$ 38'02" S, 60 $^{\circ}$ 43'51" W	Bernarde and Abe 2006 (without subspecies designation); This study (MHNCI 9586)
<i>B. b. bilineata</i>	Parque Estadual Guajar \acute{a} -Mirim	11 $^{\circ}$ 41' S, 64 $^{\circ}$ 28' W	Campbell and Lamar 2004 (as <i>B. b. smaragdina</i>); This study

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