Checklist of Amphibians and Reptiles of Reserva Biológica do Tapirapé, Pará, Brazil

Pedro H. Bernardo 1,2*, Ricardo A. Guerra-Fuentes 2, William Matiazzi 2 and Hussam Zaher 2

1 Royal Ontario Museum, Centre for Biodiversity and Conservation Biology, 100 Queen’s Park, Toronto, ON, M5S 2C6, Canada.
2 Museu de Zoologia da Universidade de São Paulo, Av. Nazaré, 481, CEP 04263-000, São Paulo, SP, Brazil.
* Corresponding author: bernardoph@gmail.com

ABSTRACT: In this study we present a list of amphibians and reptiles from the Reserva Biológica do Tapirapé (REBIOTA), an area in the Amazonian rainforest in Pará State, Brazil. We sampled the area for 21 days, in both dry and rainy seasons, using pitfall traps and active searching methods. Our efforts resulted in the discovery of 35 species of amphibians and 27 species of reptiles. This study provides the first list of amphibians and adds eight new species of reptiles for the Carajás region.

INTRODUCTION
The Amazonian morphoclimatic domain extends over an area of 6,717,772 km², from the Atlantic Ocean to the eastern slopes of the Andes, covering parts of nine countries: Brazil, Bolivia, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela (Ab’Saber 1970). The study site is located in the southeastern region of the State of Pará, in an area of intense mining industry known as Carajás. To buffer the local environment from the extensive human pressure in the region, a large area of over 800,000 ha of protected lands was established and called Mosaico de Carajás. As the name suggests, it is a conglomeration of five different reserves: Reserva Biológica do Tapirapé (REBIOTA), Floresta Nacional do Tapirapé-Aquiri, Floresta Nacional de Carajás, Floresta Nacional do Itacaiunas and Área de Proteção Ambiental do Igarapé Gelado.

Due to the historical background of mineral exploration in the area, the first scientific surveys in Carajás began in 1969, when researchers from the Museu Paraense Emílio Goeldi conducted a faunal and floral survey in a mining area (Cunha et al. 1985). The first paper about the herpetofauna in the area was a description of a subspecies of turtle (Cunha 1970). Cunha et al. (1985) and Nascimento et al. (1987) presented lists of reptiles from the REBIOTA area. To date, there has been no documentation of the amphibians from this region. In this study, we provide the first comprehensive list for the herpetofauna of REBIOTA.

MATERIALS AND METHODS
The present study was conducted as part of the REBIOTA Management Plan. The REBIOTA is a 103 ha. reserve located in the municipalities of Marabá and São Félix do Xingú, Pará State. The base of our survey was the Bacaba Camp site (05°30’13” S, 50°16’44” W, elevation from 200 to 700 m – Figure 1). The predominant vegetation in the region is Open Ombrophile Forest and Dense Ombrophile Forest with palms, bamboos and canga (IBGE 1992).

Figure 1. Map of the Reserva Biológica do Tapirapé. Green = Forest area; Pink = Anthropogenic area. Yellow circles: Sampled locations. Blue line: Tapirapé River.
Data were collected over two field surveys (August 3rd to 12th [dry season] and November 29th to December 9th [rainy season], 2008) for a total of 21 days of effective sampling. We used two complementary sampling methods: active searching and pitfall traps. Each line of pitfall trap was made using eight 60 L buckets placed eight m apart, with a drift fence 80 cm in height. The active searching method was conducted during both day and night, during day and night in all areas inside the REBIOTA, including trails in the forest and along the river (Figure 2) without standardization.

The specimens were collected under permit SISBIO number 16826-1 issued by the Brazilian Ministry of Environment (MMA- ICMBio) and deposited in the herpetological collection of the Museu de Zoologia da Universidade de São Paulo (Appendix I). Taxonomic nomenclature follows Frost et al. (2006) and Frost (2011) for amphibians and Gamble et al. (2008; 2011), Zaher et al. (2009), Forlani et al. (2010) and Hedges and Conn (2012) for reptiles.

**Results and Discussion**

From a total of 21 days of fieldwork, 35 species of amphibians and 27 species of reptiles were recorded (Table 1; Appendix II). Among the species collected in the pitfall traps, *Engystomops petersii*, *Rhinella margaritifera* and *Allobates marchesianus* were the most abundant respectively, together representing almost 60% of all specimens collected with this method.

During the first collecting period, in the dry season, we collected 12 species that were not recorded in the rainy season, one amphibian (*Allophryne ruthveni*) and 10 reptiles (*Paleosuchus trigonatus, Leposoma sp. n. (in description by Rodrigues et al.), Iguana iguana, Copeoglossum nigropunctatum, Gonatodes eladioi, G. humeralis, Plica umbra ochrocollaris, Dipsas catesbyi, Erythrolamprus taeniogaster and Micrurus spixii martiusi*). During the rainy season we collected 16 species of amphibians (*Allobates femoralis, Dendropsophus aff. branneri, D. leucophyllatus, D. melanargyreus, D. nanus, D. parviceps, Hypsiboas calcaratus, H. cinerascens, H. fasciatus, H. multifasciatus, Osteocephalus leprieurii, Phyllomedusa hypochondrialis, Scinax ruber, Sphaenorhynchus lacteus, Trachycephalus typhonius and Leptodactylus mystaceus*) and five species of reptiles (*Podocnemis unifilis, Thecadactylus rapicauda, Drymarchon corais, Erythrolamprus reginae and Bothrops atrox*) that were not recorded during the dry season. Most amphibians collected belong to the family Hylidae, which tends to be more active during the rainy season. Twenty-nine species were found in both seasons, such as the tortoises *Chelonoidis carbonaria* and *C. denticulata* and the lizards *Ameiva ameiva* and *Uranoscodon superciliosus*.

**Figure 2.** Some of the sampled areas inside the REBIOTA. A: Primary forest trail; B: Margin of the Tapirapé River; C: Flooded forest; D: Pond surrounded by a swamp inside a primary forest.
These species were found both inside the forest and on the margin of the river. *Dendropsophus* aff. *branneri* and *Leposoma* sp. could not be determined to the species level, and may have been recorded in other areas under different names. The records of *Chiasmocleis jimi* and *Proceratophrys concavitypanum* constitute significant range extensions (Bernardo et al. 2012).

The region of REBIOTA was first surveyed in the 1970’s (Cunha et al. 1985; Nascimento et al. 1987). Cunha et al. (1985) collected over an 18-month period in the Carajás region and recorded 77 species of reptiles, 17 of which were also recorded in this study. Two years later, Nascimento et al. (1987) published an updated list of reptiles from the same region, and added an additional 17 species. Among them they describe *Gonatodes eladioi* from a location approximately 80 km from our study area. Although the REBIOTA is in the same area studied by Nascimento et al. (1987), this is the first time this species has been recorded outside the type locality.

Our study provides the first list of amphibians and adds the following eight species of reptiles for the region of Mosaico de Carajás: *Paleosuchus trigonatus*, *Chelonoidis carbonaria*, *Arthrosaura kockii*, *Leposoma* sp., *Copeoglossum nigropunctatum*, *Plica umbra ochrocollaris*, and *Gonatodes eladioi* from a location approximately 80 km from our study area. Although the REBIOTA is in the same area studied by Nascimento et al. (1987), this is the first time this species has been recorded outside the type locality.

**Table 1.** List of amphibian and reptile species recorded in the Reserva Biológica do Tapirapé. Season: D- collected in dry season; R- collected in rainy season. Sampling method: P: Pitfall trap; AS: Active Search.

| SPECIES                      | SEASON | SAMPLING METHOD |
|------------------------------|--------|-----------------|
| **AMPHIBIA**                 |        |                 |
| *Allophryne ruthveni*        | D      | AS              |
| *Allobates femoralis*        | R      | AS              |
| *Allobates marchesianus*      | D,R P  | AS              |
| *Rhaebo guttatus*            | D,R P  | AS              |
| *Rhinella margaritifera*     | D,R P  | AS              |
| *Rhinella marina*            | D,R P  | AS              |
| *Proceratophrys concavitypanum* | D,R P | AS              |
| **Hyliidae**                 |        |                 |
| *Dendropsophus aff. branneri*| R      | AS              |
| *Dendropsophus leucophyllatus*| R      | AS              |
| *Dendropsophus melanargyreus*| R      | AS              |
| *Dendropsophus nanus*         | R      | AS              |
| *Dendropsophus parviceps*     | R      | AS              |
| *Hypsiboa boans*             | D,R P  | AS              |
| *Hypsiboa calcaratus*        | R      | AS              |
| *Hypsiboa cinerascens*       | R      | AS              |
| *Hypsiboa fasciatus*         | R      | AS              |
| *Hypsiboa geographicus*      | D,R P  | AS              |
| *Hypsiboa multifasciatus*    | R      | AS              |
| *Osteocephalus leprieurii*   | R      | AS              |
| *Osteocephalus taurinus*     | D,R P  | AS              |
| *Phylomedusa hypochondrialis*| R      | AS              |
| *Scinax ruber*               | R      | AS              |
| *Sphaenorhynchus lacteus*    | R      | AS              |
| *Trachyccephalus typhonius*  | R      | AS              |
| **Leiuperidae**              |        |                 |
| *Engystomops petersi*        | D,R    | P; AS           |

**Table 1. Continued.**

| SPECIES                      | SEASON | SAMPLING METHOD |
|------------------------------|--------|-----------------|
| *Physalaemus cuvieri*        | D,R    | P; AS           |
| *Leptodactylidae*            |        |                 |
| *Leptodactylus andreae*      | D,R    | P              |
| *Leptodactylus lineatus*     | D,R    | P              |
| *Leptodactylus mystaceus*    | R      | P; AS           |
| *Leptodactylus petersii*     | D,R    | P; AS           |
| *Leptodactylus rhodomystax*  | D,R    | P; AS           |
| **Microhylidae**             |        |                 |
| *Chiasmocleis avilapiresae*  | D,R    | P              |
| *Chiasmocleis jimi*          | D,R    | P              |
| *Ctenophryne geayi*          | D,R    | P              |
| **Strabomantidae**           |        |                 |
| *Pristimantis fenestratus*   | D,R    | P; AS           |
| **CROCODILIA**               |        |                 |
| *Paleosuchus trigonatus*      | D      | AS              |
| **TESTUDINES**               |        |                 |
| *Podocnemis unifilis*        | R      | AS              |
| **Testudinidae**             |        |                 |
| *Chelonoidis carbonaria*     | D,R    | AS             |
| *Chelonoidis denticulata*    | D,R    | AS             |
| **SAURIA**                   |        |                 |
| *Iguana iguana*              | D      | AS              |
| **Mabuyidae**                |        |                 |
| *Copeoglossum nigropunctatum*| R      | AS              |
| **Sphaerodactylidae**        |        |                 |
| *Chatogekko amazonicus*      | D,R    | P; AS           |
| *Gonatodes eladioi*          | D      | AS              |
| *Gonatodes humeralis*        | D      | P              |
| **Teiidae**                  |        |                 |
| *Ameiva ameiva*              | D,R    | P; AS           |
| *Kentropyx calcarata*        | D,R    | P; AS           |
| **Tropiduridae**             |        |                 |
| *Plica umbra ochrocollaris*  | D      | P              |
| *Uranoscodon superciliosus*  | D,R    | AS             |
| **SERPENTES**                |        |                 |
| *Bothrops atrox*             | R      | AS              |

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Corallus hortulanus and Erythrolamprus taeniogaster. Even though it is a widespread species, the presence of E. taeniogaster represents a new record for this area.

Conservation

According to the National Protected Areas Plan (Plano Nacional de Áreas Protegidas), the REBIOTA is classified in the map of Priority Areas for Conservation, Sustainable Use and Benefit Sharing of the Brazilian Biodiversity (MMA 2007), as a protected area of extremely high biological importance. The greater importance of REBIOTA is mainly due to the fact that it is a representative fragment of the original vegetation, which is rare in the private areas in the region occupied by large farms and agricultural projects. Even with extensive protected areas nearby, the REBIOTA is the only area of "Integral Protection", and that gives it a central role in the conservation of species on this Amazonian region. Our records, together with the previous works by Cunha et al. (1985) and Nascimento et al. (1987) help to create a more comprehensive list of species of reptiles and amphibians in the Carajás region and help specialists to make more appropriate decisions regarding the diversity of that area.

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APPENDIX 2. Live specimens collected at the REBIOTA: 1: Allophryne ruthveni; 2: Allobates femoralis; 3: Allobates marchesianus; 4: Rhaebo guttatus; 5: Rhinella margaritifera; 6: Rhinella marina; 7: Proceratophrys concavipalmum; 8: Dendropsophus aff. branneri; 9: Dendropsophus leucophyllatus; 10: Dendropsophus melanogrymus; 11: Dendropsophus nanus; 12: Dendropsophus parviceps; 13: Hypsiboas boans; 15: Hypsiboas cinerascens; 17: Hypsiboas geographicus; 18: Hypsiboas multifasciatus.
APPENDIX 2. Continuation: 19: Osteocephalus leprieurii; 20: Osteocephalus taurinus; 21: Phyllomedusa hypochondrialis; 22: Scinax ruber; 23: Sphaenorhynchus lacteus; 24: Trachycephalus typhonius; 25: Engystomops petersi; 26: Physalaemus cuvieri; 27: Leptodactylus andreae; 28: Leptodactylus lineatus; 29: Leptodactylus mystaceus; 30: Leptodactylus petersii; 31: Leptodactylus rhodomystax; 32: Chiasmocleis avilapiresae; 33: Chiasmocleis jimii; 34: Ctenophryne geayi; 35: Pristimantis fenestratus; 36: Paleosuchus trigonatus.
APPENDIX 2. Continuation: 37: Podocnemis unifilis; 38: Chelonoidis carbonaria; 39: Chelonoidis denticulata; 40: Arthrosaura kockii; 41: Arthrosaura reticulata; 42: Cercosaura ocellata ocellata; 43: Leposoma sp.; 44: Iguana iguana; 45: Thecadactylus rapicauda; 46: Copeoglossum nigropunctatum; 47: Chatogekko amazonicus; 48: Gonatodes eladioi (female); 49: Gonatodes humeralis; 50: Ameiva ameiva; 51: Kentropyx calcarata; 52: Plica umbra ochrocollaris; 53: Uranoscodon superciliosus; 54: Corallus hortulanus.
APPENDIX 2. Continuation: 55: Drymarchon corais (juvenile); 56: Dipsas catesbyi; 57: Erythrolamprus reginae; 58: Erythrolamprus taeniogaster; 59: Leptodeira annulata; 60: Philodryas argentea; 61: Micrurus spixii martiusi; 62: Bothrops atrox.