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## Morphological variation and taxonomy of *Atractus latifrons* (Günther, 1868) (Serpentes: Dipsadidae)

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### Abstract

As currently understood *Atractus latifrons* is widely distributed in South America, occurring from Suriname to the east of the Andes in Bolivia. Throughout this widespread distribution, at least three distinct color patterns were previously reported in the literature. Here, we test whether quantitative variation and qualitative distribution of morphological characters are correlated with any color pattern displayed by the species along its range. We recognize three aposematic color patterns (bicolor in monads, tricolor in dyads, and tricolor in tetrads) for *A. latifrons*. We found no obvious correspondence between these patterns and any character systems analyzed herein. Additionally, we redescribe the holotype of *A. latifrons* and report on morphological variability (meristics, morphometrics, color patterns, and hemipenis) and geographical distribution (extending its distribution to the state Roraima, Brazil) of the species.

**Key words:** Amazon Basin, Morphometry, Polychromatism, Aposematic color patterns, Mimeticism

### Introduction

The cryptozoic snake genus *Atractus* Wagler, 1828 is distributed widely in the Neotropical region, occurring from Panama to Argentina (Giraudo & Scrocchi 2000; Myers 2003). *Atractus* is the most speciose snake genus comprising about 140 species, but several taxa are still known from small series near their type localities (Passos & Lynch 2011; Passos *et al.* 2013b). Despite recent studies focusing on its taxonomy (Passos & Fernandes 2008; Passos & Arredondo 2009; Passos *et al.* 2009a,b,c,d,e; Passos *et al.* 2010a,b,c; Prudente & Passos 2008, 2010; Passos *et al.* 2013a,b,c,d; Schargel *et al.* 2013), additional efforts must be made to address instances of morphological variation, geographic range, sexual dimorphism, and ontogenetic change of coloration (Passos *et al.* 2010a,b,c). Clarifying these aspects will help solve the taxonomic status for many species within this genus (Passos & Lynch 2011; Passos *et al.* 2012). As currently understood, *Atractus latifrons* is widely distributed in South America, occurring in the Amazonian lowlands of Colombia, Venezuela, French Guiana, Suriname, Brazil, and Peru (Peters & Orejas-Miranda 1970; Gasc & Rodrigues 1980; Hoogmoed 1980; Cunha & Nascimento 1983, 1993; Martins & Oliveira 1993; Passos & Fernandes 2008; Prudente & Passos 2008). This species is found in the forest litter of primary and secondary rainforests as well as cultivation fields along the Amazon Basin (Dixon & Soini 1977, 1986; Hoogmoed 1980; Martins & Oliveira 1993, 1999; Silva 2004).

Günther (1868) described *Geophis latifrons* on the basis of a single specimen from the municipality of Pebas, department of Loreto, in the northeastern portion of Peruvian Amazon. Boulenger (1894) redefined the genus *Geophis* Wagler, 1828 and transferred *G. latifrons* to *Atractus*. Ahl (1927) described *Elaps herthae* through a specimen from the locality of Munducuru, along the Manacapuru River near Manaus, in Brazil. Savage (1960) proposed to allocate *A. elaps* and *A. latifrons* in the *A. elaps* species group, characterized by an aposematic coloration and unusual head scale pattern, maxillary dentition, and hemipenial morphology. Peters & Orejas-Miranda (1970) placed *Elaps herthae* in the synonymy of *A. latifrons*. Dixon & Soini (1977, 1986) reported on the

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## APPENDIX 1. Specimens examined.

Countries are given in bold capitals, states in plain capitals, municipalities in italics, and localities in plain text. Specimens for which fully everted and maximally expanded hemipenis were examined are indicated with an asterisk.

*Atractus latifrons* (*n* = 150). **BOLIVIA**: BENI: *Ovillas del San Martin River*: Blanco y Negro River: (MNKR 595). SANTA CRUZ: *Guarayos*: Urubichá: (MNKR 3436–39), San Martin River: (MNKR 505); *Nuflo de Chávez*: Oquinquia: San Martin River: (MNKR 1021); *Velasco*: Cruce Moira: Piso Firme: (MNKR 520), Serrania Huauchaca: (MNKR 218). **BRASIL**: without specific locality: (IBSP 20315, MZUSP 3156, 5387, 15580). ACRE: *Porto Walter*: (MZUSP 7353); AMAZONAS: without specific locality: (FMT 851, 943, 946, 1123, 1249, 1339, 1341, 1876, 2114, 2162, 2309, 2922); *Benjamin Constant*: (MNRJ 729–32, 1289, 1517–20, 1522); *Estirão do Equador*: (MPEG 161); *Canutama*: Projeto GEOMA: (INPA 23367); *Presidente Figueiredo*: Balbina Plant Hydroelectric: (MPEG 17395, 17459–60, 17499\*, 17506, 17531, 17548\*, 17556–58, 17562, 17564\*, UFC 1367); *Porto Urucu*: (MPEG 19261); *Serrinha*: Jurupá River: (MZUSP 6594); Purus River: (MNRJ 633); *Carauari*: Comunidade Nova Esperança: (INPA 14043); *Manaus*: Reserva INPA–WWF: (MNRJ 726–28, MZUSP 8658, 8462, 9500); *Mundurucu*: Manacapuru River: (ZMB 30547 holotype of *Elaps hertae*); BR–174 road: Km 80: (MZUSP 8428), KM 15: (MZUSP 7835). PARÁ: *Belém*: (MPEG 256); *Dom Eliseu*: (MPEG 10820); *Marabá*: (MPEG 17039); *Monte Dourado*: (MPEG 17745). RONDÔNIA: *Campo Novo*: Upper River Candeias: (MZUSP 5927); *Nova Brasília*: (MZUSP 8519); *Porto Velho*: Samuel Hydroelectric Plant: (IBSP 40875, 52654, MPEG 17831, 17837\*, 17842, 17901–02, 17904, 17920–21, 17959, 17979, 17990, 18008, 18140, CHUFC 1430–32, CEPB 1703–06, 1708–09, 3077, 3319), Jirau Hydroelectric Plant: (MPEG 23962–64); *Espigão do Oeste*: (MPEG 21059, 21060\*, 21061); Parque Estadual Guajará Mirim: (MPEG 20363); Ribeirão Riachuelo: Afluente Ji–Paraná: (MZUSP 5918). MATO GROSSO: *Alta Floresta*: (MZUSP 10483); *Aripuanã*: (MZUSP 11127); *Campos Novos dos Parecis*: (UFMT 4571, 4572, 4579, 7522); *Cláudia*: (UFMT 3693, 94\*–98\*, 99, 3700–06); *Nova Bandeirantes*: (UFMT 1750); RORAIMA: PARNA Viruá: (INPA 25707); No Material Origin: (ZMB 47765). **COLOMBIA**: AMAZONAS: *La Pedrera*: (MLS 210); Caqueta River: (IAvH 1483); *Leticia*: Los Lagos: (MPEG 18203–05); *Mirití–Paraná*: (MZUSP 6115); *Puerto Nariño*: (MLS 1319–21); Icara–Paraná River: (IAvH 945). CAQUETA: *Caparú*: (ICN 8163). VAUPÉS: *Chiribiquete*: Parque Natural Nacional Cueva de los Guacharos: Corregimiento Miraflores: (IAvH 12, 4264). **PERU**: LORETO: *Pebas*: (BMNH 1946.1.6.52 holotype, MNRJ 2977, 2979, 2981); *Maynas*: (MHNSM 2250, 2292, 2590, 2616); *Urarinas*: (MHNSM 27441); *Tromperos*: (MHNSM 27396); *Requema*: (MHNSM 2884).