Amphibia-Reptilia

Uncovering Neotropical treefrog diversity: Integrative taxonomy reveal paraphyly in *Boana atlantica* (Amphibia, Anura, Hylidae)

Luana Rodrigues Lima[1,2,*], Marcos Jorge Matias Dubeux[2], Filipe Augusto Cavalcanti do Nascimento[3,4], Daniel Pacheco Bruschi[5], Tamí Mott[2]

1 - Programa de Pós-Graduação em Diversidade Biológica e Conservação nos Trópicos, Instituto de Ciências Biológicas e da Saúde, Universidade Federal de Alagoas, Maceió, Alagoas, Brasil

2 - Laboratório de Biologia Integrativa, Instituto de Ciências Biológicas e da Saúde, Universidade Federal de Alagoas, Maceió, Alagoas, Brasil

3 - Programa de Pós-Graduação em Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brasil

4 - Setor de Zoologia, Museu de História Natural, Universidade Federal de Alagoas, Maceió, Alagoas, Brasil

5 - Laboratório de Citogenética Animal e Mutagênese Ambiental, Departamento de Genética, Setor de Ciências Biológicas, Universidade Federal do Paraná, Curitiba, Paraná, Brasil

*Corresponding author; e-mail: luanalima.bio@hotmail.com

Supplementary material

Table S1. Tissues used for molecular analysis, with localities and their vouchers: Célio Fernando Batista Haddad (CFBH), Museum of Natural History of the Federal University of Alagoas (MUFAL), and accession number of GenBank.

Species	Locality	State of Brazil	Voucher	Accession number
Boana atlantica				
	Camamu	Bahia	CFBH 12821	MK348482
	Camamu	Bahia	CFBH 12827	MK348484
	Ilhéus	Bahia	CFBH 15788	MK348485
	Ilhéus	Bahia	CFBH 15792	MK348486
	Uruçuca	Bahia	CFBH 16126	MK348483
	Uruçuca	Bahia	CFBH 16146	MK348487
	Uruçuca	Bahia	CFBH 16147	MK348488
	Uruçuca	Bahia	CFBH 16266	MK348489
	Uruçuca	Bahia	CFBH 16690	MK348490
	Ilhéus	Bahia	CFBH 16726	MK348491
	Uruçuca	Bahia	CFBH 18501	MK348492
	Ilhéus	Bahia	CFBH 18508	MK348493
	Uruçuca	Bahia	CFBH 19888	MK348494
	Uruçuca	Bahia	CFBH 4125	MK348495
	Uruçuca	Bahia	CFBH 4126	MK348496
	Uruçuca	Bahia	CFBH 4153	MK348497
	Aurelino Leal	Bahia	CFBH 9239	MK348498
	Aurelino Leal	Bahia	CFBH 9240	MK348499
	Aurelino Leal	Bahia	CFBH 9241	MK348500
	Uruçuca	Bahia	CFBH 11018	MK348501
	Maceió	Alagoas	MUFAL 12079 (1)	MK348502
	Maceió	Alagoas	MUFAL 12079 (3)	MK348503
	Paulista	Pernambuco	MUFAL 12581	MK348504
	Paulista	Pernambuco	MUFAL 13050	MK348505
	Paulista	Pernambuco	MUFAL 13067	MK348506
Boana punctata				
		Amazonas	INPA 17893	MK348507
		Amazonas	INPA 17922	MK348508

Table S2. Sequences imported from GenBank of the 16S ribosomal mitochondrial gene with their respective collecting sites and accession numbers.

Species	Locality (Country: State)	Accession number
Aplastodiscus perviridis	Argentina: Misiones	AY843569
Bokermannohyla aff. *alvarengai*	Brazil: Bahia	AY843677
Boana faber	Argentina: Misiones	AY549334
Boana lemai	Guiana: Monte Ayangana	AY843637
Boana punctata	Argentina: Chaco	AY549353
	Bolivia	KF723062
	Bolivia	KF723063
	Colombia: Meta	KP149476
	Colombia: Casanare	KP149397
Boana semilineata	Brazil: Rio de Janeiro	AY843779

Table S3. Morphometric data of *Boana atlantica* tadpoles from Alagoas and Bahia states, Brazil. Stage of development follows Gosner (1960). Measurements in mm. n = number of specimens analysed in each stage. Mean ± standard deviation and minimum and maximum values presented in parentheses. BL = body length, MTH = maximum tail height, TaL = tail length, TMH = tail muscle height, TMW = tail muscle width, TL = total length, BWE = body width at the eyes level, BWN = body width at the nostril level, DGO = width of the dorsal gap of the oral disc, EnD = extranarial distance, EoD = extraorbital distance, ED = eye diameter, END = eye-nostril distance, InD = intranarial distance, IoD = intraorbital distance, MBH = maximum body height, MBW = maximum body width, ND = narial diameter, ODW = oral disc width, SND = snout-nostril distance, SSD = snout-spiracle distance, SPD = spiracle-posterior body distance, DFH = dorsal fin height, VFH = ventral fin height, SL = spiracle length, and VTL = vent tube length.

Boana cf. *atlantica* of Maceió, Alagoas MUFAL4755-1, MUFAL4755-2, MUFAL4755-5/ MUFAL4755-8						*Boana atlantica* of Igrapiúna, Bahia - MZUGFS601, MZUGFS602-1, MZUGFS602-2, MZUEFS895, MZUEFS988-1, UESC-01 / UESC-05							
Stage	28 (n=2)	30	31	33	35	27	30	31 (n=2)	33	34	35 (n=3)	36	37
BL	9.9±0.4 (9.7–10.2)	10.4	10.6	9.8	11.1	10.9	11.8	13.3±0.6 (12.9–13.8)	12.9	12.1	12.3±0.7 (11.6–12.9)	13.3	10.8
MTH	4.1±0.0 (4.1–4.1)	4.2	3.8	4.3	4.0	5.0	4.8	6.9±0.0 (6.9–6.9)	5.8	5.2	6.0±0.9 (5.4–6.7)	6.3	4.9
TaL	20.7±1.35 (19.7–21.6)	20.6	21.7	25.8	25.1	22.5	28.3	22.4±0.0 (22.4–22.4)	22.6	22.5	23.7±0.0 (23.7–23.7)	27.5	20.5
TMH	2.7±0.3 (2.5–2.9)	2.8	3.1	3.2	3.3	3.8	3.8	4.1±0.2 (4.0–4.3)	3.2	3.3	3.7±0.3 (3.3–3.9)	3.8	4.2
TMW	2.6±0.3 (2.4–2.8)	2.8	3.0	3.3	3.3	3.3	3.6	3.8±0.7 (3.3–4.3)	3.6	3.3	3.6±0.2 (3.4–3.7)	3.8	3.9
TL	30.6±1.0 (29.9–31.3)	31.1	32.4	35.6	36.3	36.3	40.1	39.3±2.3 (36.6–42.0)	35.5	34.6	36.9±0.4 (36.6–37.3)	40.5	31.8
BWE	4.7±0.3 (4.5–4.9)	4.9	4.9	4.7	4.7	5.1	5.9	5,8±0.0 (5.8–5.8)	5.6	5.9	5.8±0.0 (5.8–5.8)	5.9	5.4
BWN	4.0±0.7 (3.5–4.5)	3.1	3.0	3.6	3.1	3.1	3.9	3.6±0.2 (3.5–3.7)	3.1	3.6	3.6±0.2 (3.5–3.8)	3.9	3.3
DGO	0.6±0.0 (0.6–0.6)	0.6	0.6	0.5	0.6	0.4	1.4	0.6±0.1 (0.5–0.7)	0.6	0.5	0.5±0.2 (0.4–0.8)	0.6	0.6
EnD	1.5±1.0 (0.9–2.2)	0.9	0.9	0.8	1.0	1.0	1.0	1.0±0.1 (0.9–1.2)	1.0	1.1	1.1±0.1 (0.9–1.2)	1.1	0.7
EoD	2.8±0.4 (2.5–3.0)	4.3	2.7	4.3	4.4	4.8	5.1	5.1±0.0 (5.1–5.1)	4.7	5.0	4.9±0.2 (4.7–5.1)	5.4	5.1
ED	1.1±0.1 (1.0–1.2)	1.1	1.2	1.2	1.2	1.2	1.2	1.3±0.1 (1.2–1.4)	1.1	1.1	1.2±0.1 (1.1–1.3)	1.5	1.6

END	3.2±1.2 (2.4–4.0)	2.6	4.5	2.8	2.7	2.8	2.9	3.1±0.0 (3.1–3.1)	2.8	3.1	3.1±0.1 (3.0–3.2)	3.3	2.6
InD	1.5±1.0 (1.4–1.6)	1.1	2.6	1.8	1.8	1.9	2.1	2.1±0.1 (2.0–2.1)	2.0	1.8	1.9±0.1 (1.9–2.0)	2.0	1.8
IoD	2.3±0.1 (2.3–2.4)	2.4	1.6	2.2	2.3	2.5	2.8	2.9±0.4 (2.7–3.2)	2.8	2.9	2.7±0.4 (2.4–3.2)	2.9	2.3
MBH	5.8±0.1 (5.8–5.9)	6.3	6.4	6.1	5.7	6.5	6.9	6.7±0.0 (6.7–6.7)	7.4	6.1	6.8±0.7 (6.2–7.6)	6.2	6.3
MBW	4.9±1.1 (4.2–5.7)	5.9	5.9	5.3	5.0	6.0	6.2	8.1±0.0 (8.1–8.1)	6.6	6.7	8.0±1.1 (7.3–8.8)	7.9	5.9
ND	0.6±0.1 (0.6–0.7)	0.7	0.7	0.6	0.6	0.6	0.8	0.8±0.1 (0.7–0.9)	0.6	0.8	0.7±0.1 (0.6–0.8)	0.8	1.1
ODW	2.3±0.1 (2.3–2.4)	2.4	2.4	2.4	2.3	2.0	2.8	2.7±0.2 (2.6–2.8)	2.6	2.6	2.5±0.0 (2.5–2.5)	2.8	2.0
SND	0.9±0.1 (0.9–1.0)	1.0	0.8	1.1	1.0	1.1	1.3	1.3±0.0 (1.3–1.3)	1.1	1.1	1.2±0.2 (1.0–1.4)	1.2	1.1
SSD	7.7±0.0 (7.7–7.7)	7.7	8.1	8.0	8.1	7.7	8.6	7.5±2.0 (6.1–8.9)	9.0	9.1	8.8±0.2 (8.5–8.9)	8.9	8.4
SPD	3.3±0.2 (3.1–3.4)	3.7	3.4	4.0	4.6	2.7	3.5	4.1±0.4 (3.8–4.3)	3.7	3.5	3.7±0.6 (3.1–4.2)	3.8	2.7
DFH	2.1±0.0 (2.1–2.1)	2.2	2.3	1.9	1.6	2.3	2.3	2.1±0.3 (1.9–2.3)	2.6	1.9	2.6±0.3 (2.3–2.9)	2.5	1.9
VFH	1.3±0.2 (1.2–1.4)	1.8	1.8	1.4	1.5	1.6	1.8	1.7±0.4 (1.4–1.9)	1.9	1.6	1.9±0.5 (1.3–2.3)	1.5	1.4
SL	1.9±0.1 (1.8–1.9)	1.6	1.9	1.1	1.4	1.9	1.7	2.3±0.3 (2.1–2.5)	2.5	2.0	2.4±0.7 (1.8–3.1)	2.5	2.7
VTL	1.8±0.7 (1.3–2.3)	2.3	2.6	1.6	2.4	1.5	1.9	2.7±0.2 (2.5–2.8)	1.9	1.4	1.9±0.0 (1.9–1.9)	1.5	1.6