# A NEW SPECIES OF *PHASMAHYLA* CRUZ, 1990 (ANURA: HYLIDAE) FROM THE STATE OF BAHIA, BRAZIL

Carlos Alberto G. Cruz<sup>1</sup>, Marcelo F. Napoli<sup>2</sup>, Patricia M. Fonseca<sup>2</sup>

<sup>1</sup> Universidade Federal do Rio de Janeiro, Museu Nacional, Departamento de Vertebrados, Quinta da Boa Vista, CEP 20940-040, Rio de Janeiro, RJ, Brasil. E-mail: cagcruz@uol.com.br

ABSTRACT. A new species of the genus *Phasmahyla* is described from an Atlantic Rain Forest remnant at Serra do Timbó, Municipality of Amargosa, State of Bahia, Brazil. The new species is recognized by its medium size for the genus (snout-vent length 32.4 to 35.8 mm in males); reduced to absent coloration with purple spots on concealed surfaces of arm, forearm, thigh, tibia, tarsus, and digits; male with moderate nuptial pad of minuscule horny asperities on finger I; tympanum distinct only on ventral half; dorsolateral glands well developed; dorsal skin slightly coarse; larval oral disc with distinct anterior and two posterior series of horny teeth; interrupted first posterior series of horny teeth slightly larger than the anterior one. Temporal and spectral parameters of the advertisement call are described for the new species, and for the first time for the genus *Phasmahyla*.

KEYWORDS. Taxonomy, Phyllomedusinae, Phasmahyla timbo sp. nov., Tadpole, Advertisement call.

## Introduction

The genus Phasmahyla Cruz, 1990 currently consists of five species: P. guttata (Lutz, 1924), P. cochranae (Bokermann, 1966), P. jandaia (Bokermann and Sazima, 1978), P. exilis (Cruz, 1980), and P. spectabilis Cruz, Feio, and Nascimento, 2008 (Cruz, 1990; Cruz et al., 2008; Frost, 2007). Phasmahyla is associated with mountain streams at the Atlantic Rain Forest fragments and adjacent areas influenced by this domain (see Ab'Sáber, 1977 for definition of the Atlantic Forest Morphoclimatic Domain). The genus is distributed within the Serra do Mar, Serra da Mantiqueira, and Serra do Espinhaço mountain ranges, in southern, southeastern, and northeastern Brazil (Cruz, 1990; Cruz et al., 2008). The currently known northernmost distribution limit for the genus *Phasmahyla* lies in the southern State of Bahia (Phasmahyla spectabilis, Municipality of Jussari, 15°09'S, 39°31'W), and the southernmost in the State of Paraná (*Phasmahyla guttata*, Municipality of Morretes, 25°28'S, 48°50'W) (Cruz, 1990; Cruz et al., 2008).

Recent surveys of anurans in Atlantic Rain Forest fragments at the Serra do Timbó, Municipality of Amargosa, State of Bahia, Brazil, led us to find a new species of *Phasmahyla*, described herein.

### MATERIAL AND METHODS

Specimens examined are housed in the (AL) Coleção Adolpho Lutz, Museu Nacional, Universidade

Federal do Rio de Janeiro; (EI) Coleção Eugenio Izecksohn, Universidade Federal Rural do Rio de Janeiro; (CFBH) Coleção Célio Fernando Baptista Haddad, Universidade Estadual Paulista, Rio Claro; (LZVG) Coleção do Laboratório de Zoologia de Vertebrados, Universidade Federal de Ouro Preto; (MCNAM) Museu de Ciências Naturais da Pontificia Universidade Católica de Minas Gerais; (MZUFV) Museu de Zoologia João Moojen de Oliveira, Universidade Federal de Viçosa; (MNRJ) Museu Nacional, Universidade Federal do Rio de Janeiro; (MZUSP) Museu de Zoologia, Universidade de São Paulo; (UFBA) Museu de Zoologia, Universidade Federal da Bahia; (USNM) National Museum of Natural History, Smithsonian Institution, Washington, USA; and (WCAB) Werner Carlos Augusto Bokermann, São Paulo (now housed in Museu de Zoologia, Universidade de São Paulo). Specimens of *Phasmahyla cochranae* (CFBH 7318) from Poços de Caldas, State of Minas Gerais, and of Phasmahyla jandaia (LZVG 06, 39, and 60) from Ouro Preto, State of Minas Gerais, were examined by Delio Pontes Baeta. Measurements follow Napoli (2005) and they are in millimeters: SVL (snout-vent length); HL (head length); HW (head width); IND (internarial distance); END (eye to nostril distance); ED (eye diameter); TD (tympanum diameter); UEW (upper eyelid width); IOD (interorbital distance); THL (thigh length); TL (tibia length); FL (foot length).

Nomenclature and measurements of tadpoles follow Altig and McDiarmid (1999), except for the interorbital and internarial distances, which were taken between inner margins of eyes and nostrils, respectively. Tadpoles examined are from Serra do Timbó

<sup>&</sup>lt;sup>2</sup> Universidade Federal da Bahia, Instituto de Biologia, Departamento de Zoologia, Museu de Zoologia, Rua Barão de Geremoabo 147, Campus Universitário de Ondina, CEP 40170-290, Salvador, BA, Brasil. E-mail: <a href="mailto:napoli@ufba.br">napoli@ufba.br</a>; patriciamfonseca@yahoo.com.br

(13°04'S, 39°38'W, ca. 800 m altitude), Municipality of Amargosa, State of Bahia, Brazil: UFBA 7510, collected on 13-22 January 2007, by P.M. Fonseca; UFBA 8000 and MNRJ 52066, collected on 17 May 2008, by M.F. Napoli, P.M. Fonseca, C.A.G. Cruz, and M.A. Freitas.

Description is based on one specimen in stage 37 (Gosner, 1960). Comparisons of the tadpole of the new species with those of other *Phasmahyla* are based on literature information from Cruz (1982) and Cruz *et al.* (2008).

Recordings of two specimens of the new species (UFBA 7987-7988) were obtained on 04 January 2008 and 22 November 2007 respectively, during a survey of anurans in Serra do Timbó, Municipality of Amargosa, State of Bahia, Brazil. These specimens were found at night, calling on branches that were standing upright 1.70-2.00 m from a stream in an Atlantic Forest remnant. Frog vocalizations were recorded in the field with a MP4 Philips SA31XX recorder by P.M. Fonseca and T.F.S. Silva. Tapes were analyzed with Avisoft-SASLab Light for Windows, version 3.74, and Sound Ruler Acoustic Analysis, version 0.9.6.0. The vocalizations were digitized with a sampling frequency of 8 kHz; the audiospectrogram was made with bandwidth 117 Hz, Fast Fourier

Transform length (FFT) 256, overlap 93.75%, frame 100%, and window Flat Top. Six call parameters were measured: call (= note) duration (s), pulse number, pulse duration (s), interval between pulses (s), call dominant frequency (kHz), and frequency amplitude (kHz). The dominant frequency of each call was measured from a power spectrum. The terminology used for the description of the advertisement calls follows Duellman and Trueb (1986).

## RESULTS

*Phasmahyla timbo* sp. nov. (Figs. 1-2)

*Holotype* – UFBA 6423, adult male (Fig. 1), collected at the Serra do Timbó (13°04'S, 39°38'W, 800 m altitude), Municipality of Amargosa, State of Bahia, Brazil, on 13-22 January 2007, by P.M. Fonseca, T.F.S. Silva, T. Filadelfo, B. Hamdan, and M.A. Freitas.

Paratopotypes – UFBA 6434, adult male, UFBA 6480, juvenile, MNRJ 52061 (ex-UFBA 6435), 52062 (ex-UFBA 6432), 52063 (ex-UFBA 6476), 52064 (ex-UFBA 6433), and 52065 (ex-UFBA 6424), adult



FIGURE 1. Phasmahyla timbo sp. nov., holotype (UFBA 6423, SVL 35.8 mm), dorsal and ventral views.

males, collected with the holotype; UFBA 7296, adult male, collected on 13 April 2007, by R.O. Abreu and P.M. Fonseca; UFBA 7508, adult male, collected on 19 July 2007, by M.F. Napoli, R.O. Abreu, and P.M. Fonseca; UFBA 7987, adult male, collected on 04 January 2008, by P.M. Fonseca and T.F.S. Silva; and UFBA 7988, adult male, collected on 22 November 2007, by T.F.S. Silva and M.A. Freitas.

Diagnosis – The new species is characterized by: (1) medium size for the genus (SVL 32.4 to 35.8 mm in males); (2) parotoid glands absent; (3) dorsolateral glands well developed; (4) loreal region obtuse; (5) tympanum distinct only on ventral half; (6) supratympanic fold developed and covering the superior half of the tympanum; (7) male with moderate nuptial pad of minuscule horny asperities on the base of finger

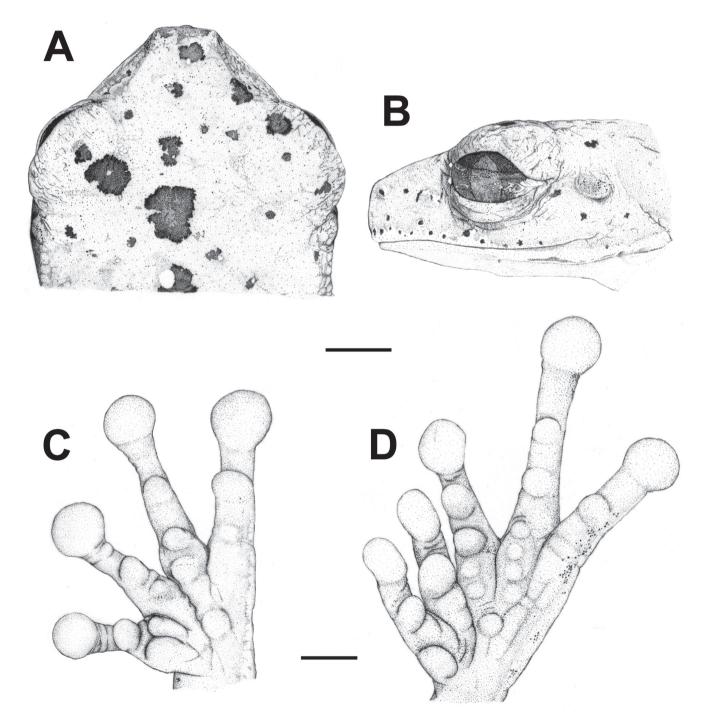


FIGURE 2. *Phasmahyla timbo* sp. nov., holotype (UFBA 6423). (A) Dorsal and (B) lateral views of head (bar equals 3.5 mm); ventral views of (C) hand and (D) foot (bar equals 1.7 mm).

I; (8) reduced to absent coloration with purple spots on concealed surfaces of arm, forearm, thigh, tibia, tarsus, and digits; (9) dorsal skin slightly coarse; (10) oral disc of tadpole with upper (A-1) and lower (P-1 and P-2) series of horny teeth distinct, with interrupted P-1 slightly larger than A-1.

Comparisons with other species – Phasmahyla timbo sp. nov. is promptly distinguished from *P. guttata*, P. cochranae, P. jandaia, and P. spectabilis by the reduced to absent coloration with purple spots on concealed surfaces of arm, forearm, thigh, tibia, tarsus, and digits (developed coloration on *P. guttata*, P. cochranae, P. jandaia, and P. spectabilis). From P. guttata, P. jandaia, P. exilis, and P. spectabilis the new species differs by the greater size of the laterodorsal glands (moderate to weak laterodorsal glands on P. guttata, P. jandaia, P. exilis, and P. spectabilis). Furthermore, the new species is distinguished from P. guttata and P. spectabilis by the smooth or almost smooth external margins of forearms and tarsus (crenulated in *P. guttata* and *P. spectabilis*), by a small calcar appendage (large in P. guttata and P. spectabilis), and by the slightly coarse dorsal skin (coarse in P. guttata and P. spectabilis); P. timbo sp. nov. differs from P. cochranae by a moderate nuptial pad of minuscule horny asperities at the base of finger I (large nuptial pad of conspicuous horny asperities at the base of finger I in *P. cochranae*); P. timbo sp. nov. is distinguished from P. jandaia by the larger size (SVL 28.0 to 33.0 mm in males of P. jandaia) and moderate nuptial pad of minuscule horny asperities at the base of finger I (smaller in P. jandaia); P. timbo sp. nov. differs from P. exilis by the moderate development of the body and limbs (body and limbs very slender in P. exilis), and moderate nuptial pad of minuscule horny asperities at the base of finger I (larger in P. exilis).

Description of the holotype – Body slender; head depressed, slightly longer than wide, head length contained about 39% of the SVL; snout truncate in dorsal and lateral views (Figs. 2A and B); nostrils placed laterally near the tip of snout; canthus rostralis distinct, in dorsal view slightly curved; loreal region slightly obtuse and concave; eye large, protuberant, directed anterolaterally, its diameter approximately 32% of head length; eye to nostril distance nearly equal to two times the tympanum diameter; internarial distance 22% of head width and equal to 66% of eye diameter; interorbital distance 35% of head width; tympanum small, only its ventral half distinct, its di-

ameter 13% of head length; supratympanic fold developed and covering the superior half of the tympanum; tongue elongated, free on the posterior half, rounded behind; vomerine teeth absent; choanae small, oval, and widely separated.

Arms long and slender; forearms long and robust, with weak dermal ridges around the dorsal surfaces; hand robust (Fig. 2C) with finger lengths  $I < II < IV \le III$ , not webbed, with approximately circular and well-developed terminal discs; inner metacarpal tubercle large, oval, at the base of finger I; outer metacarpal tubercle absent; a large medium metacarpal tubercle present; subarticular tubercles medium sized, ovoid, and prominent; supernumerary tubercles present, rounded; moderate nuptial pad of minuscule horny asperities at the base of finger I.

Legs long and slender; thigh length slightly smaller than tibia length, the sum of thigh and tibia lengths about 93% of snout vent length; foot length about 58% of snout vent length; calcar appendage very small; foot slender (Fig. 2D) with toe lengths I < II < III < V < IV, not webbed, with well-developed discs, approximately circular, about same size of fingers discs; inner metatarsal tubercle medium sized, ovoid; outer metatarsal tubercle absent; subarticular tubercles medium sized, ovoid, and prominent; supernumerary tubercles absent. Dorsal skin slightly coarse with scattered warts; ventral surface of belly granulated; gular region and ventral surfaces of limbs, except thighs, smooth; region of cloacal opening granulated.

Color in life (Fig. 3) – Dorsal surfaces of body, forearms, legs, loreal, and tympanic regions light green with white and dark brown scattered warts; upper



FIGURE 3. *Phasmahyla timbo* sp. nov. (in life) from the Serra do Timbó, Municipality of Amargosa, State of Bahia, Brazil. Photo R.O. Abreu.

arms, fingers, and toes orange with scarce small purple spots on fingers IV, toes IV and V; iris cream; flanks, inguinal region, internal and external sides of tibia, and internal side of tarsus orange; coloration of small purple spots on flanks; ventral surfaces whitish; nuptial asperities dark brown. At night, the green color becomes brownish red.

Color in preservative — Dorsal surfaces of body, forearms, legs, loreal, and tympanic regions purple, with white and dark brown scattered warts of different sizes; upper arms, fingers, and toes cream with scarce small purple spots on finger IV, toes IV and V; iris light cupreous; flanks, inguinal region, internal and external sides of tibia, and internal side of tarsus cream; coloration of small purple spots on flanks; ventral surfaces cream; nuptial asperities dark brown.

Measurements of the holotype (in mm) – SVL 35.8; HL 14.0; HW 13.8; IND 3.0; END 3.5; ED 4.5; TD 1.8; UEW 4.2; IOD 4.9; THL 16.4; TL 16.9; FL 21.0.

Variation – Examined specimens are congruent with respect to the morphological characters. The brown warts on dorsum of body are variable in number and size; specimen MNRJ 52065 presents numerous small dots while individual MNRJ 52062 has large warts covering almost completely the dorsum. The sum of thigh and tibia lengths ranges from 93% to 100% of snout vent length. Variations in measurements are presented in Table 1.

Tadpole – At stage 37, tadpole total length 39.0 mm, body length 14.0 mm, body width 8.0 mm, body height 8.7 mm, maximum tail height 10.4 mm, nostril snout distance 3.1 mm, interorbital distance 5.0 mm, internarial distance 5.6 mm, eye to nostril distance 1.4 mm, eye diameter 2.4 mm, and oral disc width 6.2 mm; body elliptical in dorsal view and nearly oval in lateral view (Fig. 4A), approximately 36% of total length; nostrils dorsolateral, nearer to the eye than to the tip of snout, with a small dorsal prominence; eyes lateral, diameter approximately half of interorbital and internarial distances; spiracle ventral, sinistral, its opening at half of body length and attached to the body wall; anal tube dextral, long, free of the ventral fin, and inclined posteroventrally; tail approximately 63% of total length, with maximum height at middle of tail length; dorsal fin originating at the end of body, ventral fin originating at the proximal end of last third of body and deeper than dorsal fin, both fins slightly arched; tail tip flagelliform; tail

Table 1. Descriptive statistics of measurement variables of *Phasmahyla timbo* sp. nov. n, number of specimens;  $\overline{X}$ , arithmetic mean; SD, standard deviation.

Males (n = 11)			
Characters	Range	$\overline{X}$	SD
SVL	32.4-35.8	35.2	1.59
HL	12.5-14.0	13.2	0.52
HW	12.0-13.8	12.8	0.56
IND	2.2-3.0	2.6	0.21
END	3.0-3.5	3.3	0.17
ED	4.0-4.6	4.3	0.21
UEW	3.3-4.2	3.6	0.29
IOD	4.2-4.9	4.5	0.26
TD	1.8-2.0	1.8	0.15
THL	15.9-17.7	16.6	0.56
TL	16.6-18.5	17.3	0.55
FL	21.0-23.3	22.2	0.72

musculature robust; oral disc (Fig. 4B) modified into an anterodorsal funnel-shaped structure surrounded by a series of small papillae; dorsal margin with a conspicuous reentrance, deep and narrow, ventral margin slightly rounded; surface of oral disc with numerous sparse papillae, larger than the marginal papillae; two large elongate papillae on each side of the horny beak; upper and lower jaw sheaths with serrate margins, upper jaw sheath with a conical projection, lower jaw sheath V-shaped; tooth row formula 1/2(1), teeth rather separated from each other, interrupted row P1 slightly longer than A1, row P2 just shorter than row P1.

In preservative, dorsal surface light brown; ventral surface grayish; tail musculature light brown, more pigmented dorsally and with a lateral dark brown

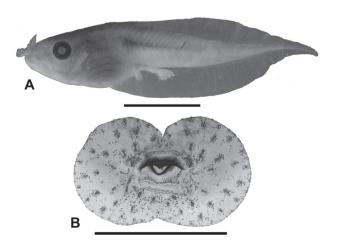


FIGURE 4. *Phasmahyla timbo* sp. nov., tadpole on stage 37. (A) Lateral view (bar equals 10.0 mm) and (B) oral disc (bar equals 5.0 mm).

stripe on the first third; tail fins with dispersed light brown pigment, less abundant on the first third; iris black with dispersed small, unpigmented areas; oral disk light brown with dark brown papillae.

In life, dorsal surface and caudal musculature varying from olivaceous to gray; ventral surface translu-

cid on the anterior half and white on the posterior half; dorsal fin light gray with irregular and disperse olivaceous blotches; ventral fin translucid.

Tadpoles of *P. timbo* differ from tadpoles of *P. co-chranae* and *P. exilis* by the oral disc having distinct anterior and posterior series of horny teeth (both vesti-

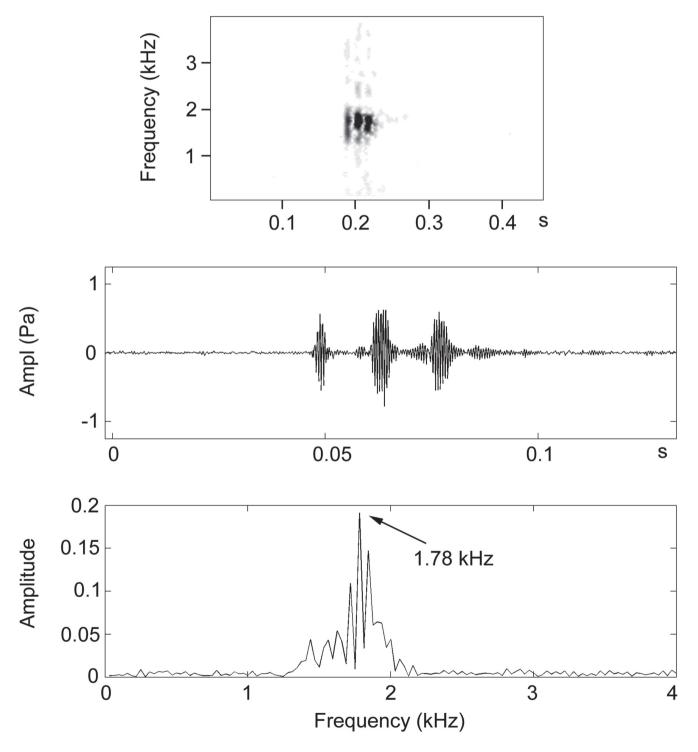


Figure 5. (A) Audiospectrogram, (B) oscillogram, and (C) power spectrum of the advertisement call of *Phasmahyla timbo* sp. nov. from the Serra do Timbó, Municipality of Amargosa, State of Bahia, Brazil. Air temperature 20.9°C.

Cruz, C.A.G. et al.

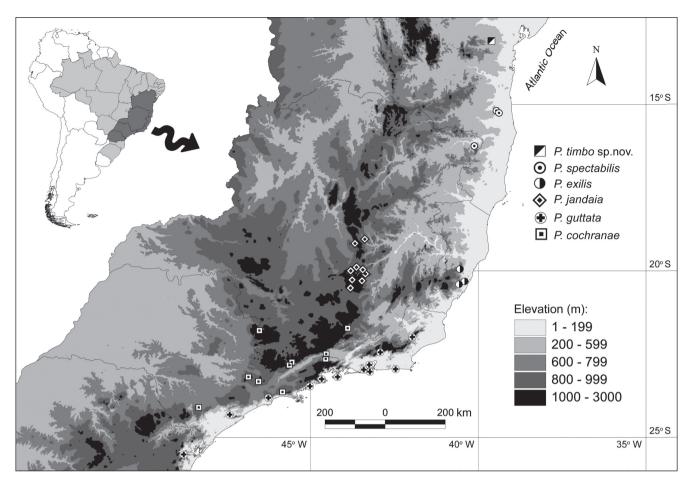


FIGURE 6. Geographic distribution of the genus Phasmahyla on topographic map within the Brazilian Tropical Atlantic Forest.

gial in *P. cochranae* and *P. exilis;* Cruz, 1982). From *P. guttata* and *P. jandaia*, the tadpoles of *P. timbo* differ in tooth row P2 being slightly shorter than row A1 (P2 as long as A1 in *P. guttata* and *P. jandaia;* Cruz, 1982). From *P. spectabilis,* the tadpoles of *P. timbo* differ in tooth row P1 longer than A1 (P1 shorter than A1 in *P. spectabilis;* Cruz *et al.,* 2008) and in tooth row P1 with narrow medial interruption (P1 broadly interrupted in *P. spectabilis;* Cruz *et al.,* 2008).

At stages 26, 36, 37, 40, and 41, observed tadpoles of *P. timbo* present variations in the intensity of brown pigments on the body and tail, and presence or not of small unpimented areas on tail musculature. Few tadpoles present the ventral margin of oral disc slightly indented. At stage 41, tadpoles present several disperses black dots on dorsum.

*Etymology* – The specific name, a noun in apposition, refers to the type locality, Serra do Timbó.

Natural History – Adult males (type series) from Serra do Timbó, Municipality of Amargosa, State of Bahia, Brazil, were captured near a forest stream, standing upright 1.7-2.0 m from the ground. Tadpoles inhabit the same streams where adult males were collected and heard.

Advertisement call — The following description is based on calls from two topotypic adult males (UFBA 7987-7988). Calls emitted sporadically. Calls with one note, comprised by two (13%), three (84%), or four pulses (2%) (Fig. 5). Call (= note) duration ranged from 0.08 to 0.09 s ( $\overline{X}$  = 0.027; SD = 0.004; n = 44); pulse duration ranged from 0.0037 to 0.0063 s ( $\overline{X}$  = 0.0037; SD = 0.0006; n = 125); interval between pulses from 0.005 to 0.011 s ( $\overline{X}$  = 0.0089; SD = 0.0012; n = 81). Call dominant frequencies ranged from 1.56 to 1.94 kHz ( $\overline{X}$  = 1.75; SD = 0.10, n = 32). The frequency amplitude ranged from 1.25 to 2.15 kHz (n = 32). Calls without frequency modulation.

Geographical distribution – Phasmahyla timbo sp. nov. is known only from the Serra do Timbó (12°25'S, 39°38'W), a mountain range characterized by a rugged relief covered mainly by tropical semi-

deciduous forests, and reaching elevations from 800 to 900 m altitude. The Serra do Timbó lies within the municipalities of Amargosa, Ubaíra, and Brejões, in the State of Bahia, Brazil, and belongs, with the Serra da Jibóia (12°52'S, 39°28'W), to a set of disjunct mountains located north of the Serra Geral mountain range. The Serra do Timbó is placed in the western part of the geographic region known as Recôncavo Baiano, and is ca. 95 km northeast from the municipality of Maracás (13°26'S, 40°25'W). This region was considered by Ab'Sáber (1977) as a transitional area among the Caatinga, Cerrado, and Tropical Atlantic domains. The tropical-humid climate prevails in the Serra do Timbó, but the region is surrounded by sub-humid and semi-arid climates.

Species of the genus *Phasmahyla* are distributed within distinct mountain ranges in northeastern, southeastern, and southern Brazil, and *P. timbo* sp. nov. represents the northernmost distribution range of the genus (Fig. 6).

Conservation – The forest cover of Serra do Timbó. and its associated biota, are currently threatened by human activities, mainly by deforestation for the development of banana and cacao plantations, pastures, and selective logging of species of commercial interest. Concomitantly, the springs that rise in Serra do Timbó and support the water supply of the municipalities of Amargosa, Ubaíra, Matuípe, and Jiquiriçá are also endangered. Currently, the Serra do Timbó is object of a conservation movement (Timbó's Project) that seeks to protect natural resources including plant and animal species as well as their habitat. The Timbó's Project is developed by the Centro Sapucaia, Núcleo Mata Altântica (Ministério Público), and municipal government of Amargosa. This action includes the creation of a conservation unit with 674 ha of tropical semi-deciduous forest, supported by the Ministério do Meio Ambiente (information obtained from Centro Sapucaia, 2008), and comprises the only known population of Phasmahyla timbo sp. nov.

# RESUMO

Uma nova espécie do gênero *Phasmahyla* é descrita de remanescente de Floresta Atlântica na Serra do Timbó, Município de Amargosa, Estado da Bahia, Brasil. A nova espécie é definida pelo seu porte médio para o gênero (comprimento rostro-cloacal 32,4 a 35,8 mm em machos); presença reduzida ou ausência

de manchas em forma de gotas purpúreas nas superfícies ocultas do braço, antebraço, coxa, tíbia, tarso
e dedos; calo nupcial de tamanho moderado, formado por uma placa composta de minúsculos espinhos
córneos sobre o dedo I; tímpano distinto apenas na
metade inferior; glândulas laterodorsais bem desenvolvidas; pele do dorso levemente áspera; disco oral
do girino com a série anterior e as duas posteriores de
dentículos córneos distintas; primeira série posterior
de dentículos córneos interrompida e um pouco mais
comprida que a série anterior. Os parâmetros temporais e espectrais do canto de anúncio são descritos
para a nova espécie e pela primeira vez para o gênero
Phasmahyla.

#### ACKNOWLEDGEMENTS

We are indebted to the Centro de Desenvolvimento Sustentável e Agroecologia Sapucaia – Centro Sapucaia, Márcia Luzia Cardoso Neves, and Raul Lomanto Neto for allowing us to access research areas under their care and for logistical assistance at Serra do Timbó; municipal government of Amargosa for logistical support; T.F.S. Silva for *Phasmahyla timbo* advertisement call recordings; T.F.S. Silva, M.A. Freitas, and R.O. Abreu for help with field work; R.O. Abreu for line drawings; D.P. Baêta for informations on the geographical distribution of *Phasmahyla cochranae* and *P. jandaia*. The Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for financial support and for a fellowship to CAGC.

## LITERATURE CITED

- AB'SÁBER, A. N. 1977. Os domínios morfoclimáticos na América do Sul. Primeira aproximação. Geomorfologia, 52:1-21.
- ALTIG, R. AND R. W. McDIARMID. 1999. Body plan: development and morphology; pp. 24-51. In: R. W. McDiarmid and R. Altig (Eds.), Tadpoles: The Biology of Anuran Larvae. The University of Chicago Press, Chicago.
- Centro Sapucaia. 2008. Projeto Timbó. Available at www. centrosapucaia.org.br/prjto\_timbo. Accessed 02 August 2008.
- CRUZ, C. A. G. 1982. Conceituação de grupos de espécies de Phyllomedusinae brasileiras com base em caracteres larvários (Amphibia, Anura, Hylidae). Arquivos da Universidade Federal Rural do Rio de Janeiro, 5:147-171.
- CRUZ, C. A. G. 1990. Sobre as relações intergenéricas de Phyllomedusinae da Floresta Atlântica (Amphibia, Anura, Hylidae). Revista Brasileira de Biologia, 50:709-726.
- CRUZ, C. A. G., R. N. FEIO AND L. B. NASCIMENTO. 2008. A new species of *Phasmahyla* Cruz, 1990 (Anura: Hylidae) from the Atlantic Rain Forest of the states of Minas Gerais and Bahia, Brazil. Amphibia-Reptilia, 29:311-318.
- Duellman, W. E. and L. Trueb. 1986. Biology of Amphibians. McGraw Hill, New York, 670 pp.
- Frost, D. R. 2007. Amphibian Species of the World: an Online Reference. Version 5.0 (1 February 2007). Eletronic Database

- acessible at http://research.amnh.org/herpetology/amphibia/index.php. American Museum of Natural History, New York, USA. Accessed 13 April 2008.
- GOSNER, K. L. 1960. A simplified table for staging anuran embryo and larvae with notes on identification. Herpetologica, 16:183-190.
- Napoli, M. F. 2005. A new species allied to *Hyla circumdata* (Anura: Hylidae) From Serra da Mantiqueira, southearstern, Brazil. Herpetologica, 61:63-69.

Submitted 03 November 2008 Accepted 20 November 2008

### APPENDIX

# Additional specimens examined.

Phasmahyla cochranae: Rio de Janeiro: EI 7499, Itatiaia; São Paulo: MZUSP 3609, 32071, 36569, Boraceia; MNRJ 4027 (paratype), MZUSP 75619 (paratype), Campos do Jordão; MZUSP 14916-14919, Cidade Azul; Estação de Fruticultura, Serra da Bocaina, São José do Barreiro; USNM-FS 5436, Eugenio Lefévre; MNRJ 4175, Jundiai; EI 7500, Mairiporã; MNRJ 28021, Parque Estadual Intervales, Ribeirão Grande; Minas Gerais: MNRJ 24839, Parque Estadual do Ibitipoca, Lima Duarte; CFBH 7318, Poços de Caldas.

*Phasmahyla exilis:* BRAZIL: Espírito Santo: Reserva Biológica Duas Bocas, Cariacica (MNRJ 24633); Santa Teresa (MNRJ 41120, paratype).

Phasmahyla guttata: Rio de Janeiro: MNRJ 27636 and MNRJ 27728, Parque Estadual da Pedra Branca, Rio de Janeiro; MNRJ 61687-61692, Horto Botânico, Rio de Janeiro; MNRJ 0665, 0671, 8033, Duque de Caxias; MNRJ 2217, Ilha Grande, Angra dos Reis; MNRJ 30285 Palmital, Saquarema; EI 7501, 7502-7504, Parati; MNRJ 51811, Santa Maria Madalena; MNRJ 49231-49232, 49235-49236, Teresópolis; São Paulo: WCAB 18477-18478, Paranapiacaba; WCAB 30411-30412, Miracatu; CFBH 4286, 5704, 12308, Ubatuba; Paraná: AL s/n, Morretes.

Phasmahyla jandaia: Minas Gerais: MNRJ 4104 (paratype), MNRJ 39980-39981, Serra do Cipó, Jaboticatubas, Conceição do Mato Dentro; MZUFV 6031, Ajudinha de Minas; MCNAM 4420, Barão de Cocais; MCNAM 1347, Caeté; MNRJ 49708-49710, Catas Altas; MCNAM 7861-7863, Congonhas do Campo; MZUFV 7561, Ouro Branco; MCNAM 3202, Nova Lima; LZVG 06, 39, 60, Ouro Preto; MCNAM 6337, 6354, Parque Nacional da Serra do Cipó, Santana do Riacho.

*Phasmahyla spectabilis:* Minas Gerais: MNRJ 43078 (holotype), MNRJ 43079 (paratype), MNRJ 43080 (paratype), MNRJ 43076-43077 (paratypes), Santa Maria do Salto; Bahia: MNRJ 28425 (paratype), Jussari; MNRJ 44981-44982 (paratypes), Arataca.