

A NEW AND THREATENED ISLAND-DWELLING SPECIES OF *CYCLORAMPHUS* (ANURA: CYCLORAMPHIDAE) FROM SOUTHEASTERN BRAZIL

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ABSTRACT: We describe a new species of *Cycloramphus* of the *eleutherodactylus* group from the Ilha dos Alcatrazes, southeastern Brazil, with descriptions of advertisement and territorial calls and notes on natural history. Additionally, we describe the advertisement and territorial calls of *C. eleutherodactylus*. The new species is diagnosed by the following set of characters: snout truncate in lateral and dorsal views; head wider than long; eyes protruding; tibia shorter than thigh; and distinct advertisement call. The new species is known from a single population on the Ilha dos Alcatrazes, a 149 ha island about 35 km off São Paulo State coast where these frogs are scattered in a small valley. The very restricted range of the new species of *Cycloramphus* and the declining quality of its habitat qualify this frog as critically endangered.

Key words: Atlantic forest; Conservation; *Cycloramphus*; Insular herpetofauna; New species; Southeastern Brazil

THE GENUS *Cycloramphus* Tschudi has 26 currently recognized species (Frost, 2007). All of them are endemic to the Atlantic rainforest in Brazil (Heyer, 1983), one of the most threatened ecosystems in the world (Myers et al., 2000). The species within *Cycloramphus* are grouped in five distinct assemblages: *bolitoglossus*, *eleutherodactylus*, *fuliginosus*, *granulosus*, and *ohausi* (Heyer, 1983).

From an ecomorphological perspective, species of *Cycloramphus* may be conveniently placed in two assemblages: aquatic and terrestrial (e.g., Verdade, 2005). The aquatic assemblage is composed of the *fuliginosus*, *granulosus*, and *ohausi* groups, which are characterized by flattened bodies and well-developed interdigital membranes in the feet; habitats in rocky streams in the forest (with the exception of *C. bandeirensis*, which dwells in open highland areas, Heyer, 1983), placement of eggs in layers on rocks and roots in streams or waterfalls, and tadpoles that hatch and feed on rocky stream banks (Verdade, 2005). The terrestrial assemblage is composed of the *bolitoglossus* and *eleutherodactylus* species groups, which have shorter limbs and

no interdigital membranes; terrestrial or semi-fossorial habitats (often on the leaf litter or on rocks, or especially in crevices), large eggs, laid on the ground, and tadpoles which are apparently endotrophic and hatch in advanced phases (Verdade, 2005).

The *Cycloramphus eleutherodactylus* group is composed of two species, *C. eleutherodactylus* and *C. diringshofeni* (Heyer, 1983). These two species are characterized by indistinct tympana, smooth or slightly glandular dorsal textures, no distinct tubercles, distinct inguinal glands, and toes free of interdigital membranes. Herein we describe, based on recently collected specimens, a new island-dwelling species of *Cycloramphus* from the Ilha dos Alcatrazes off the northern coast of the State of São Paulo, southeastern Brazil. Vocalizations, notes on the natural history, and conservation status are presented. We also describe the advertisement and territorial calls of *C. eleutherodactylus*.

MATERIALS AND METHODS

All specimens examined were deposited in the following collections: CFBH (Célio F. B. Haddad collection, Departamento de Zoologia, Universidade Estadual Paulista, Rio

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Claro, SP, Brasil), MNRJ (Museu Nacional, Rio de Janeiro, RJ, Brasil), MZUSP (Museu de Zoologia, Universidade de São Paulo, São Paulo, SP, Brasil); and ZUEC (Museu de História Natural, Universidade Estadual de Campinas, SP, Brasil).

We took the following measurements from 11 specimens of the new species of *Cycloramphus* and 10 specimens of *C. eleutherodactylus* (of the type series and of topotypes) to the nearest 0.01 mm, with digital calipers: snout-vent length (SVL), head length (HEL), head width (HW) between the extremities of mouth, thigh length (THL) from cloaca to the outer surface of the flexed knee, tibia length (TBL) from the inner surface of the flexed knee to the outer surface of tarsus articulation, arm length (ARL) from the outer surface of elbow to the base of metacarpal tubercle, foot length (FL) from tip of fourth toe to the base of the outer metatarsal tubercle, and hand length (HL) from tip of the third finger to the base of the outer metacarpal tubercle. We also measured interorbital distance at the midpoint of the orbits (IOD), eye-nostril distance (END), and internarial distance (IND) using a stereomicroscope with a micrometric ocular. All measurements follow Heyer et al. (1994) and Duellman et al. (1997). Description of snout shape is based on Cei (1980) and Heyer (1983). Sex was determined by the presence of inguinal glands in males (absent in females) and by detection of presence of eggs in females. Coloration patterns were based on Heyer (1983). All collected specimens were euthanized using xylocaine at 10%, fixed in 10% formalin, and transferred to 70% ethanol for permanent storage.

Calls of the new species of *Cycloramphus* were recorded at the Ilha dos Alcatrazes, municipality of São Sebastião, São Paulo state, on 18 August 2005 between 1900 and 2100 h, with a Marantz PMD 222 tape recorder and a Sennheiser ME 66 microphone. Vocalizations of *C. eleutherodactylus* were recorded at the Serra de Paranapiacaba (type locality), municipality of Santo André, São Paulo State, on 26 November 1991 at 0830 h, with a Sony TCM 12 and microphone Sony F-VS7. Descriptions of the resulting sonograms were based on calls by one individual of *C. eleutherodactylus* and three individuals of the new species. The spectrogram and wave-

form were analyzed with the software Raven 1.2.1 (Cornell Laboratory of Ornithology, Ithaca, USA), with fast Fourier transformation (FFT) of 512 points.

We used Kruskal-Wallis ANOVA to compare SVL between the new species and *Cycloramphus eleutherodactylus* and between sexes of the new species (Zar, 1996). To eliminate the effects of body size from other morphometric characters, we used Kruskal-Wallis ANOVAs to compare the following ratios between sexes of the new species and males of the new species ($n = 6$) and of *C. eleutherodactylus* ($n = 8$): HEL/trunk length (SVL minus HEL), HW/SVL, IOD/HEL, END/HEL, IND/HW, THL/SVL, TBL/SVL, ARL/SVL, FL/SVL, and HL/SVL. We carried out statistical analyses using Statistica 6.0 (STATSOFT, Inc., 2003) with a significance level of 5%.

SPECIES DESCRIPTION

Cycloramphus faustoi sp. nov. (Figs. 1–4)

Holotype.—Adult male (CFBH 12843), collected in the Saco do Funil (24° 05' 84" S, 45° 41' 42" W) at the Ilha dos Alcatrazes (135 ha), municipality of São Sebastião, São Paulo state, southeastern Brazil, on 18 August 2005 by C. A. Brasileiro, H. M. Oyamaguchi, M. T. C. Thomé, and R. J. Sawaya.

Paratopotypes.—Adult males (CFBH 12836 and 12838–12839), collected on 22 September 2004 by F. E. Barbo and M. Martins. Adult females (CFBH 12841–12842), collected with the holotype, CFBH 12840, adult female, collected on 31 March 2005 by C. A. Brasileiro, H. M. Oyamaguchi, and M. T. C. Thomé; adult male (ZUEC 13658), collected on 22 September 2004 by C. A. Brasileiro and M. T. C. Thomé. Adult female (MNRJ 43144) collected with holotype. Adult female (MNRJ 43145) collected on 31 March 2005 by C. A. Brasileiro, H. M. Oyamaguchi, and M. T. C. Thomé. Adult female (MZUSP 135739), collected on 31 March 2005 by C. A. Brasileiro, H. M. Oyamaguchi, and M. T. C. Thomé.

Diagnosis.—A new species of the *Cycloramphus eleutherodactylus* species group (males 31.2–37.9 mm SVL, females 41.6–



FIG. 1.—*Cycloramphus faustoi* type locality and two specimens in situ. Ilha dos Alcatrazes, with the Saco do Funil in the middle (top left); habitat (top right); adult individual (bottom left); female guarding an egg clutch (bottom right).

44.0 mm SVL) characterized by (1) snout truncate in dorsal and lateral views, (2) head wider than long, (3) eyes protruding, (4) upper eyelid lacking tubercles or with a few small tubercles; (5) tympanum not visible externally, but it can be found with removed skin, (6) lack of vocal slits; (7) vocal sac indistinct, (8) dentigerous process of vomer triangular, each bearing six teeth, (9) tibia shorter than thigh, (10) tibia + thigh size same size as SVL, (11) toes free, (12) dorsal skin slightly smooth, and (13) in life, dorsum dark brown with yellow or white scattered spots.

Besides *Cycloramphus faustoi*, the *C. eleutherodactylus* group is composed of *C. eleutherodactylus* and *C. diringshofeni*. Based on external morphology the new species is similar to *C. eleutherodactylus*. The new species is a little larger than *C. diringshofeni*

(males up to 31 mm), have no vocal slits (present in *C. diringshofeni*), and lacks dorsolateral ridge (present in *C. diringshofeni*). From *Cycloramphus eleutherodactylus*, the new species differs by having wider and shorter head (Fig. 2; Table 1); relative interorbital distance smaller ($H_{1,14} = 4.82$; $P = 0.028$); relative eye-nostril distance smaller ($H_{1,11} = 5.14$; $P = 0.023$); truncated snout in dorsal, ventral, and lateral views (rounded in *C. eleutherodactylus*; Figs. 2; 3); less protruding eyes (Fig. 2); less concave loreal region; tibia shorter or the same size as thigh (compressing the tibia against the thigh, the knees do not touch each other; in *C. eleutherodactylus* the knees touch each other). The dorsal color of *C. faustoi* is darker than that of *C. eleutherodactylus*, with less evident pattern. The diagnostic differences

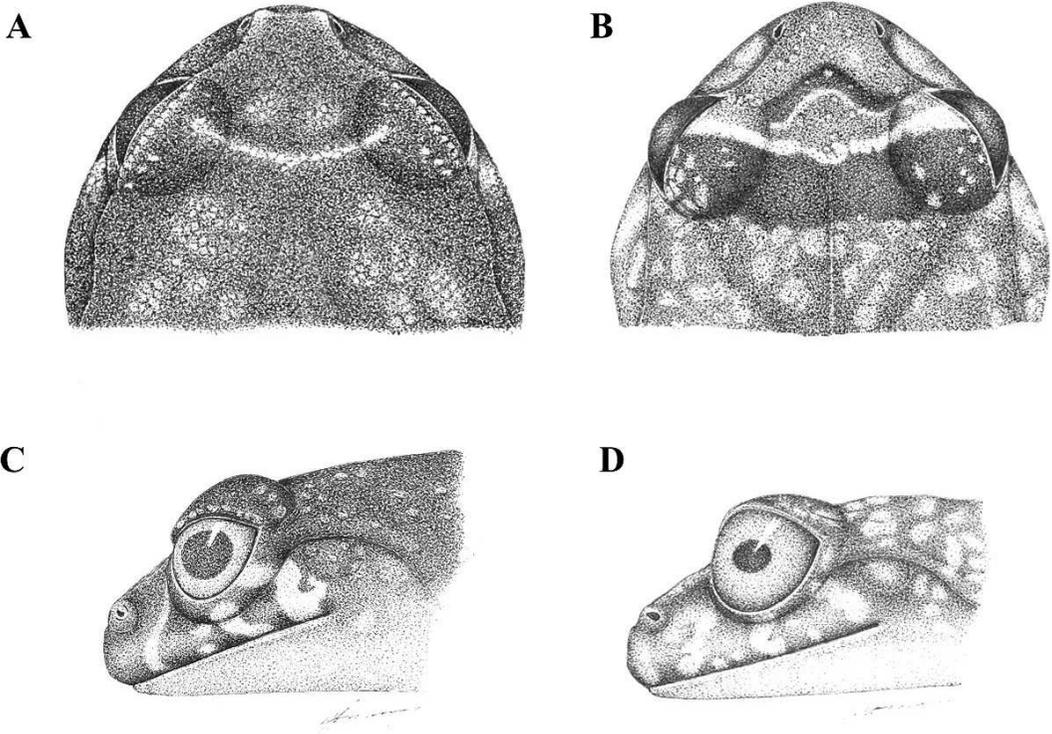


FIG. 2.—Dorsal and lateral views of head of *Cycloramphus faustoi* and *C. eleutherodactylus*. (A and C) *C. faustoi* (holotype CFBH 12843); (B and D) *C. eleutherodactylus* (topotype, ZUEC 6468).

between *C. faustoi* and *C. eleutherodactylus* are summarized in Table 1.

Description of holotype.—Body robust, elliptical in dorsal view; head wider than long (Fig. 2A); internarial distance smaller than eye-nostril distance and smaller than eye diameter; eye diameter larger than eye-nostril distance; snout truncate in lateral and dorsal views (Fig. 2A, C); nostrils protuberant; loreal region concave; eyes protruding; tympanum not visible externally, but it can be observed when skin is removed; supratympanic fold discrete, extending from tympanic region to shoulder; vocal sac indistinct; vocal slits lacking; tongue smooth, elliptical, and notched anteriorly; denticerous process of vomer triangular, each bearing six teeth; choanae medium-sized, rounded, not concealed by palatal shelf of maxillary. Arm slender; forearm slightly robust, ulnar fold absent, hand length longer than forearm length; fingers without webbing and fringes; finger lengths $I < II < IV < III$ (Fig. 4A); outer metacarpal

tubercle rounded and slightly larger than inner elliptical metacarpal tubercle. Tibia length a little shorter than thigh length; sum of thigh and tibia lengths similar to SVL; tarsal fold and tarsal tubercles absent; toes without webbing and lateral fringes; toe lengths $I < II < V < III < IV$ (Fig. 4B); inner metatarsal tubercle elliptical and larger than round outer metatarsal tubercle. Round inguinal glands. Dorsal and ventral skin mostly smooth.

Measurements of holotype (mm).—SVL 33.9, HEL 15.1, HW 14.2, IOD 6.7, END 3.5, IND 3.3, ARL 8.9, HL 10.7, THL 18.4, TBL 19.0, and FL 18.5.

Color of holotype in preservative.—Dorsal pattern is uniformly dark brown with small white spots; labial pattern consists of distinct bars; narrow whitish interorbital bar. Three brown bars on dorsal surface of forelimb. Ventral surfaces of forelimb light brown. Thigh, tibia, and foot with dark brown bars interspaced by whitish bars. Ventral surface of hindlimb light brown. Phalangeal articulations

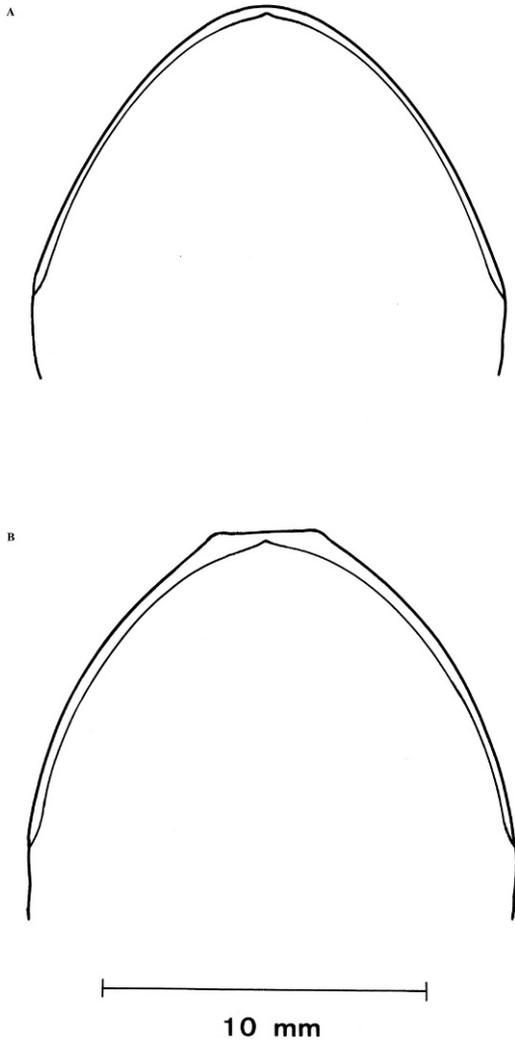


FIG. 3.—Ventral view of heads of (A) *Cycloramphus eleutherodactylus* (topotype, ZUEC 6468) and (B) *Cycloramphus faustoi* (holotype CFBH 12843).

of hand and foot without pigmentation dorsally and ventrally. Throat and belly light brown. Vomer region black.

Variation.—Some specimens have a few upper eyelid tubercles (absent in the holotype). In some specimens (50%), tibia length is similar to thigh length. Color pattern somewhat variable. As in other species of



FIG. 4.—*Cycloramphus faustoi* CFBH 12843 (holotype), left hand and foot.

TABLE 1.—Morphological diagnostic characters between *Cycloramphus faustoi* and *C. eleutherodactylus*.

	<i>C. faustoi</i> sp. n.	<i>C. eleutherodactylus</i>
Morphological characters		
head	wider than large	larger than wide
snout in ventral view	truncate	round
snout in dorsal view	truncate	round
snout in lateral view	truncate	acuminate-rounded
eyes	not protruding	protruding
loreal region	slightly concave	concave
legs	tibia shorter than thigh	tibia same size as thigh
dorsum color	dark brown	brown and cream
dorsum pattern	almost uniform	patterned

Cycloramphus (Heyer, 1983), dorsal pattern uniformly dark brown with small white spots in all females. Males more variable: 50% are similar to females; 35% have large and coalescent dark blotches, and 15% have a broken pattern (sensu Heyer, 1983). Labial pattern in females consists of indistinct bars; males with indistinct (50%) to distinct bars (50%). Interorbital white narrow line evident (80%) or discontinuous (20%). Brown bars on dorsal side of arms vary in number and color intensity. Ventral surfaces of arm and forearm uniform brown. Bars on thigh from inguinal region to knee vary in intensity, width, and position. Ventral surface of thigh varies from uniform brown (all females; 75% of males) to mottled (25% of males). Throat pattern varies from uniform brown (75% of females and males) to slightly mottled. Throat darker brown than belly, with dark spots, sometimes in patches. Belly pattern lightly mottled (40%

of females, 50% of males), distinctly mottled (40% of females, 33% of males) to almost immaculate (20% of females, 17% of males).

Color in life.—Dorsum brown to dark brown (Fig. 1) with a few white to yellowish spots; narrow interorbital bar light yellow; tibia, thigh, and arm with a few white to light yellow bars (Fig. 1); phalangeal articulations of hand and foot without pigmentation dorsally and ventrally; throat white with a few brown spots; belly immaculate whitish in most individuals (with a few brown spots in some of them).

Sexual dimorphism.—Females lack inguinal glands and are larger than males (Table 1). In addition, males have significantly relative larger head length, tibia length, arm length, foot length, and hand length (Table 2).

Vocalization.—The advertisement call of *C. faustoi* consists of two different types of notes (Fig. 5A), with two initial notes shorter than

TABLE 2.—Descriptive statistics of morphometric characters (in mm) for males and females of *Cycloramphus faustoi*: snout-vent length (SVL), head length (HEL), head width (HW), interorbital distance (IOD), eye-nostril distance (END), internostril distance (IND), thigh length (THL), tibia length (TBL), arm length (ARL), foot length (FL), and hand length (HL). Results of Kruskal-Wallis ANOVA tests (H) for relative measurements of each character between sexes (excluding body size effects, see methods), and relative larger sex (f = female; m = male). Significant differences are indicated by p-values in bold ($n = 6$ for males, except HEL and END, $n = 5$, and $n = 5$ for females).

Character	Males		Females		Relative larger		Sex
	Median	Range	Median	Range	P-value	H	
SVL	34.3	31.2–37.9	42.2	41.6–44.0	0.006	7.50	f
HEL	14.2	13.6–15.3	16.2	15.6–16.9	0.016	5.77	m
HW	15.7	14.2–17.1	18.7	17.9–19.7	0.100	2.70	m
IOD	6.8	6.4–7.3	8.3	8.1–9.3	0.361	0.83	f
END	3.3	3.1–3.5	3.7	3.6–3.7	0.327	0.96	m
IND	3.3	3.0–3.5	3.6	3.5–4.2	0.465	0.53	m
THL	18.6	16.9–19.3	21.1	19.2–22.7	0.068	3.33	m
TBL	18.6	17.8–19.0	20.2	19.9–22.2	0.018	5.63	m
ARL	8.4	8.1–8.9	9.1	8.6–10.6	0.045	4.03	m
FL	18.6	17.7–19.3	20.2	19.2–21.1	0.029	4.80	m
HL	10.3	9.7–10.7	11.2	10.1–12.5	0.045	4.03	m

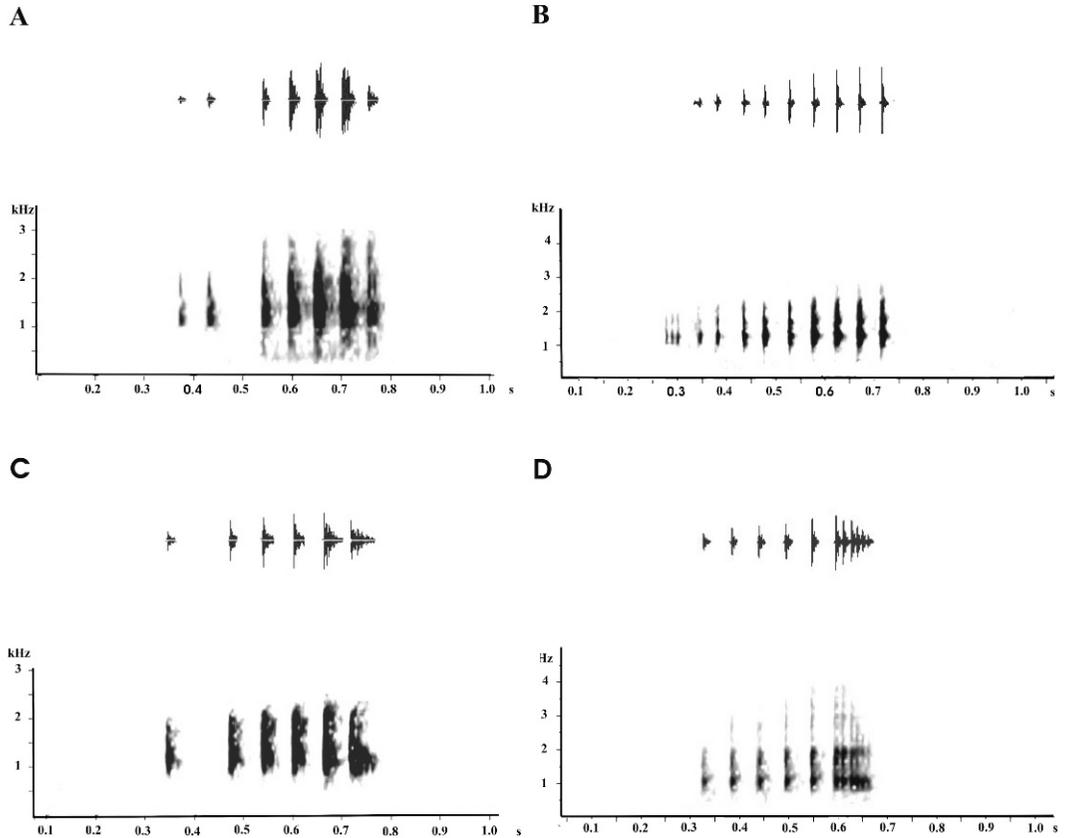


FIG. 5.—Waveform (upper) and spectrogram (lower) of the advertisement and territorial calls of *Cycloramphus faustoi* and *C. eleutherodactylus*. (A) advertisement call of *C. faustoi* recorded at 2100 h at the Ilha dos Alcatrazes, municipality of São Sebastião, off São Paulo state, Brazil. Air temperature = 23 C; (B) Territorial call of *C. faustoi* recorded at 2030 h at the Ilha dos Alcatrazes, municipality of São Sebastião, off São Paulo state, Brazil. Air temperature = 23 C; (C) advertisement call of *Cycloramphus eleutherodactylus* recorded at 830 h at Paranapiacaba, municipality of São André, São Paulo, Brazil. Air temperature = 23 C; (D) territorial call of *Cycloramphus eleutherodactylus* recorded at 0830 h at Paranapiacaba, municipality of São André, São Paulo, Brazil. Air temperature = 22 C.

the subsequent notes. Each call is composed of 4–7 notes (median = 5 notes, $n = 9$ calls). Duration of initial note ranges 11–21 ms (median = 15 ms; $n = 9$ notes). Duration of subsequent notes ranges 13–38 ms (median = 19 ms; $n = 38$). Interval between the initial and the second notes (median = 69 ms, range 39–94; $n = 9$) is longer than the interval between the subsequent notes (median = 34 ms, range 17–80; $n = 38$). Call duration ranges 253–417 ms (median = 368 ms, $n = 9$ calls) and the interval between calls ranges 52–87 s (median = 69 s, $n = 8$). Dominant frequency 0.9–2.2 kHz ($n = 9$ calls).

Two territorial calls emitted naturally by one male of *C. faustoi* were analyzed. They

consisted of a sequence of 9–16 notes (Fig. 5B); initial notes shorter than the last ones. Duration of initial notes ranged 5–8 ms; third note duration ranges 6–9 ms; last note duration ranges 13–19 ms. Interval between notes ranges 11–39 (median = 28 ms, $n = 21$ intervals). Call duration ranges 452–652 ms (median = 552 ms, $n = 2$ calls). Dominant frequency ranges 0.9–2.2 kHz. Territorial calls of *C. faustoi* have more notes than the advertisement calls, although both have the same duration.

Three calls of one male of *Cycloramphus eleutherodactylus* were analyzed for comparison. The advertisement call consists of two note types (Fig. 5C), the initial note shorter

than the following notes, similar to *C. faustoi*. Each call is composed of six notes ($n = 3$ calls). Duration of initial note ranges 11–13 ms (median = 12 ms; $n = 3$ notes). Duration of subsequent notes ranges 20–54 ms (median = 23 ms; $n = 15$). Interval between the initial and the second notes (median = 114 ms, range 112–114; $n = 3$) longer than the interval between the subsequent notes (median = 35 ms, range 28–45; $n = 15$). Call duration ranges 404–434 ms (median = 410 ms, $n = 3$ calls). The dominant frequency ranges 0.8–2.2 kHz ($n = 3$ calls).

Six territorial calls emitted after playback by one male of *C. eleutherodactylus* were analyzed. The territorial call consists of a sequence of 6–9 notes (median = 7 notes, $n = 6$ calls; Fig. 5D) with duration increasing gradually. Initial note duration ranges 9–11 ms (median = 11 ms; $n = 6$ notes); third note duration ranges 11–17 ms (median = 13 ms; $n = 6$ notes); last note duration ranges 35–75 ms (median = 52 ms; $n = 6$ notes). Interval between notes ranges 4–51 (median = 39 ms, $n = 34$). Call duration ranges 336–355 ms (median = 340 ms, $n = 6$ calls). Dominant frequency ranges 0.6–2.1 kHz ($n = 6$ calls). Interval between calls ranges 391–1262 ms (median = 64 ms; $n = 5$). Territorial calls of *C. eleutherodactylus* have more notes and are shorter than the advertisement calls; dominant frequency is slightly lower in territorial calls.

Cycloramphus faustoi and *C. eleutherodactylus* have distinct advertisement calls. Calls of the new species usually have two short introductory notes, whereas *C. eleutherodactylus* has one introductory note. The mean duration of the initial note is longer in *C. faustoi*, whereas the mean duration of subsequent notes is longer in *C. eleutherodactylus*. Comparisons between the territorial calls of the two species show that the number of notes in *C. faustoi* calls is higher than in those of *C. eleutherodactylus*; however, the duration of calls and notes is shorter in the new species. Dominant frequency is lower in *C. eleutherodactylus*.

Natural history.—*Cycloramphus faustoi* was found in a small valley area (Saco do Funil; Fig. 1) bordered by Atlantic forest in

a dry stream bed composed of several large rocks. During the rainy season, the water trickles through this valley. Both males and females were found in rock crevices (Fig. 1). These frogs are wary and hide when disturbed, but after a few minutes they return to the previous spot. Two additional frog species were recorded in the Ilha dos Alcatrazes, *Scinax alcatraz* (Hylidae) and *Leptodactylus marmoratus* (Leptodactylidae). The former frog spends its entire life cycle (clutch-tadpoles-adults) in bromeliads (C. A. Brasileiro, personal observation), whereas the latter frog is a leaf litter-dweller with its clutches placed in burrows dug out in the forest floor by the males (C. F. B. Haddad and I. Sazima, personal observations). Thus, there is no overlap in habitat requirements between *C. faustoi* and the other two frog species found on the island.

We made a total of 11 field trips to the Ilha dos Alcatrazes during 2002–2005, in January, March, April, and August–December. We found *C. faustoi* in March, August, and September. Calling activity was recorded in one night only after a rainy afternoon in August 2005 when five males were calling from rock crevices. On the same night, we found a female guarding an egg clutch in a crevice (Fig. 1). The female (SVL = 44.1; mass = 10.1 g; CFBH 12842) did not leave the clutch even upon our disturbance. The swelled throat (possibly storing water) of the female was in contact with the eggs (Fig. 1), which likely kept the clutch moist. The clutch had 31 large white eggs, with an average diameter of 3.8 mm (SD = 0.4; range = 2.9–4.6 mm; $n = 25$).

The *C. eleutherodactylus* and the *C. bolitoglossus* groups are composed of species that have large terrestrial eggs (Heyer and Crombie, 1979; Verdade, 2005). From the latter group, *C. acangatan* (Verdade, 2005; Verdade and Rodrigues, 2003) and *C. stejneri* (Heyer and Crombie, 1979) also have large unpigmented eggs placed in leaf litter, under trunks, or in small burrows. Parental care in these latter two species was recorded, but males as well as females guard the egg clutch (e.g., Verdade, 2005). Tadpoles of species of both *C. eleutherodactylus* and *C. bolitoglossus* groups hatch in advanced stages

of development, are endotrophic (sensu Thiabauderau and Altig, 1999) and use the yolk to complete development.

In the remaining groups of *Cycloramphus*, all species for which there are data have semi-terrestrial tadpoles (C. F. B. Haddad, personal observation). Eggs usually are laid in layers on wet rocks or roots on stream banks. Males of *C. dubius* (Giaretta and Cardoso, 1995) and *C. boraceiensis* (Giaretta and Facure, 2003) guard the egg clutches. Tadpoles hatch in initial stages and feed on wet rocks on stream banks.

Two females with well developed oocytes (ovules) were collected in March 2004. The mean number of ovules per female was 23 (SD = 2.8; range = 21–25 mm). Ovules are white, with average diameter 3.4 mm (SD = 0.06 mm; range = 3.3–3.5 mm; $n = 20$ ovules from two females).

Cycloramphus faustoi seems to be scarce on the island. The maximum number of individuals recorded in one night was 11. For instance, *C. boraceiensis* and *C. dubius* from nearby coastal localities in the State of São Paulo occur in higher abundance; up to 30 individuals may be found in small stretches of streams at night (C.F.B. Haddad and R.J. Sawaya, personal observations). The vicinity of the Saco do Funil (the only known place of occurrence of the new species) is used by the Brazilian Navy for artillery training activities. This practice on occasion ignites the vegetation (see left portion of the island without trees in Fig. 1), as was the case for the fire in November 2004, thus posing a serious threat to *C. faustoi* and other island endemics such as the small pitviper *Bothrops alcatraz* (see Marques et al., 2002).

Geographic distribution.—*Cycloramphus faustoi* is known only from the type locality.

Etymology.—The specific name honors Fausto Pires de Campos for his untiring efforts for the preservation and scientific research in the Ilha dos Alcatrazes.

DISCUSSION

The Ilha dos Alcatrazes, as well as other islands in São Paulo state, was isolated during one or more of the several oscillations of sea level during the Pleistocene (Martin et al., 1986), the last of which occurred about

11,000 yrs ago (Souza et al., 2005). During this period, an ancestor of *C. faustoi* from the mainland or from other neighboring islands (e.g., the Ilha de São Sebastião) might have migrated and differentiated on the island. Another nonexclusive possibility is the differentiation of a relictual population of a *C. faustoi* ancestor isolated in the Alcatrazes during the sea level oscillations throughout the Pleistocene. The very specific habitat and probable low dispersal ability of *Cycloramphus* in general strengthens the last suggestion. Molecular studies comparing island and mainland populations of this frog genus could clarify this evolutionary question. Other frog species were recently identified and described from some islands off São Paulo state, such as *Scinax faivovichii* (Brasileiro et al., 2007a) from the Ilha dos Porcos Pequena and *Scinax peixotoi* (Brasileiro et al., 2007b) from the Ilha da Queimada Grande. The endemic *Scinax alcatraz* was described from the Ilha dos Alcatrazes. All these species of *Scinax* belong in the *S. perpusillus* species group, which breed exclusively in water accumulated in the axils of bromeliads (Peixoto, 1987). Similarly to these *Scinax* species, *C. faustoi* has a specialized reproductive mode (terrestrial eggs in crevices). Almost all frog species presently recorded in islands off the coast of the state of São Paulo have specialized reproductive modes (C.A. Brasileiro, personal observation). These specializations may further endanger their existence in the small islands.

Given the extremely restricted range, habitat specificity, and the pending threat to the habitat of *C. faustoi*, we propose that this species be regarded as susceptible to extinction and, thus, included in the Critically Endangered category of the IUCN Red List of Threatened Species (IUCN, 2006; www.redlist.org). Two additional herpetological endemics of the Ilha dos Alcatrazes, the treefrog *Scinax alcatraz* and the pitviper *Bothrops alcatraz* (Marques et al., 2002) are already included in the IUCN Red List.

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APPENDIX I:

Additional Specimens Examined

Cycloramphus eleutherodactylus (lectotypes): MZUSP 024, (paralectotype) MZUSP 020, (paratypes) MZUSP 57967, 57969, 57970; (topotypes) CFBH 2060; ZUEC 2120, 2723, 3533, 6468, 6367; *Cycloramphus diringshofeni* MZUSP024 (holotype); MNRJ 43139.