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The Tadpoles of the Southern Crested Toad, *Peltophryne guentheri* (Anura: Bufonidae), from Hispaniola

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The toad genus *Peltophryne* is endemic to the West Indies (Frost et al. 2006, Pramuk 2006, Pramuk et al. 2007). Cuba is the center of radiation of the genus with eight described species, followed by Hispaniola with three species and the Puerto Rico Bank with one species. The other bufonid in the region is the introduced Cane Toad (*Rhinella marina*). Tadpoles of all Cuban species have been at least briefly described and illustrated (see Díaz and Cádiz 2008), and some notes provide information on the tadpole of the Puerto Rican Toad, *P. lemur* (Rivero et al. 1980, Paine 1984). However, larvae of the native toads of Hispaniola remain undescribed.

The Southern Crested Toad (*Peltophryne guentheri*; Fig. 1) is the Hispaniolan toad with the widest distribution.

Fig.1. Adult male Southern Crested Toad (*Peltophryne guentheri*) from the Río Gurabo, Santiago Rodríguez Province, Dominican Republic. Photograph by Luis M. Díaz.

This species occurs in both xeric and mesic situations and in both well preserved habitats and those dramatically altered as a consequence of human activity. The species seems to be an opportunistic breeder that reproduces in lentic habitats like flooded open areas, temporary pools, marshes, cattle ponds, and streams edges (Schwartz and Henderson 1991, Henderson and Powell 2009).

Methods

We collected 45 tadpoles of *P. guentheri* on 7 June 2012 in the Río Gurabo, Santiago Rodríguez Province. Some larvae were reared until metamorphosis to confirm species identity. Herein we describe the tadpoles from this single locality, provide some ecological information and compare them with those of other species in the genus *Peltophryne*.

Tadpole morphological terminology and measurements basically follow Altig and McDiarmid (1999), except that: (1) The interorbital distance was measured as the space between the inner margins of the eyes, instead of the centers of the pupils, and (2) the internarial distance was measured in the same way. Developmental stages were determined according to Gosner (1960). All measurements were taken with a caliper (0.01 mm accuracy) and an ocular micrometer in a dissecting microscope. Tadpoles were preserved in 10% formalin and stored as lots, but individual voucher specimens were examined and deposited in the collection of the Museo Nacional de Historia Natural de Santo Domingo, Dominican Republic (MNHNSD), catalogued with a field number of the project "Anfibios Amenazados y Cambio Climático en República Dominicana" (Endangered Amphibians and Climate Change in Dominican Republic), abbreviated as "Proyecto Rana RD" (lot PRRD 653).

Results

Description (Fig. 2).—A tadpole maximum length of 20.6 mm was recorded for an individual in Gosner's stage 38. Measurements by developmental stages are shown in Table 1. The body is ovoid in dorsal view and slightly depressed in profile. Body width is 65% (57–71%) of body length and body height 76% (69–84%) of body width. The widest

Fig. 2. Wild-caught tadpole of the Southern Crested Toad (*Peltophryne guentheri*), Gosner's stage 37, in lateral (top), dorsal (middle), and ventral (bottom) views. Scale bar = 2 mm. Photographs by Luis M. Díaz.

Table 1. Measurements (in millimeters) of 25 tadpoles of *Peltophryne guentheri* in different developmental stages from Río Gurabo, Santiago Rodríguez, Dominican Republic. Data are reported as the mean value with the range in parentheses.

Gosner's stage	31[1] (n = 4)	33[2] (n = 4)	34[3] (n = 4)	35[4] (n = 8)	36[5] (n = 2)	37[6] (n = 1)	38[7] (n = 1)
Total length	14.7	16.6	17.2	18.3	18.6	20.2	20.6
	(13.1–16.7)	(15.3–17.4)	(16.3–18.7)	(16.9–19.2)	(18.4–18.8)		
Body length	6.6	7.1	7.4	7.7	7.8	8.2	8.2
	(5.8–7.0)	(6.7–7.2)	(6.8–8.1)	(7.5–8.0)	(7.6–8.0)		
Body width	4.2 (3.9–4.4)	4.8 (4.6–5.0)	5.0 (4.6–5.4)	4.9 (4.3–5.4)	4.9	5.0	5.1
Body height	3.3 (2.9–3.6)	3.5 (3.3–3.7)	3.7 (3.6–3.8)	3.8 (3.5–4.2)	4.0–4.1	4.2	3.7
Tail length	8.2 (6.2–9.7)	9.6 (8.0–10.2)	9.8 (9.4–10.6)	10.5 (9.2–11.5)	10.8–10.9	11.9	11.3
Tail maximum height	3.8 (3.5–4.0)	4.0 (3.6–4.6)	4.0 (3.8–4.5)	4.3 (4.1–4.7)	4.2 (4.1–4.3)	4.5	4.2
Dorsal fin height	1.6 (1.5–1.8)	1.7 (1.5–1.9)	1.7 (1.5–1.8)	1.8 (1.7–1.9)	1.7–1.8	1.9	1.9
Ventral fin height	1.1 (1.0–1.2)	1.1 (1.0–1.4)	1.1 (0.9–1.4)	1.2 (0.9–1.3)	1.2–1.3	1.4	1.2
Caudal muscle height	1.4 (1.2–1.5)	1.6 (1.4–1.6)	1.6 (1.4–1.8)	1.6 (1.5–1.7)	1.7	1.8	1.8
Caudal muscle width	1.3 (1.1–1.5)	1.4 (1.3–1.5)	1.4 (1.3–1.6)	1.5 (1.4–1.6)	1.5 (1.4–1.6)	1.5	1.7
Dorsum-spiracle distance	1.6 (1.4–1.7)	1.7 (1.6–1.8)	1.7 (1.5–2.1)	1.9 (1.7–2.4)	1.8	1.9	2.0
Snout-spiracle distance	4.6 (4.2–4.9)	5.1 (4.7–5.4)	5.2 (4.8–5.7)	5.4 (5.2–5.8)	5.1–5.6	5.4	5.6
Narial diameter	0.3 (0.2–0.4)	0.3 (0.2–0.4)	0.3 (0.2–0.4)	0.3 (0.2–0.4)	0.3–0.4	0.3	0.4
Internarial distance	0.8 (0.7–0.9)	0.8 (0.7–0.9)	0.9 (0.8–1.0)	0.9 (0.8–1.1)	0.9–1.1	0.9	0.8

Voucher specimens: [1]PRRD 653.1, 653.8, 653.14, 653.23; [2]653.7, 653.13, 653.20, 653.25; [3]653.6, 653.9, 653.10, 653.12; [4]653.3, 653.5, 653.15, 653.18, 653.19, 653.21, 653.22, 653.24; [5]653.11, 653.16; [6]653.17; [7]653.4.

region of the body is just posterior to the eyes. The snout is broadly rounded. Eyes are dorsal, directed laterally, and not visible from below. Interorbital distance is 34% (25–40%) of body width. Nostrils are dorsal, nearer to the eye than the tip of the snout, and reniform. Narial diameter is 4–6% of body width and internarial distance 57% (39–100%) of interorbital distance. The spiracle is sinistral, positioned quite low on the flank. The spiracular tube is continuous with the body wall. Snout-spiracle distance is 70% (65–75%) of body length. The vent tube is median and attached to the ventral fin. The tail is taller than the body, with a height 112% (96–134%) of body height; the upper margin is slightly convex, the lower margin straight, both tapering gradually to a rounded tip. Caudal musculature is robust in the proximal half, its height 38% (33–42%) of tail total height. The dorsal fin is 43% (38–48%) of tail total height, originating at the body-tail terminus, and highest on the middle of tail. The ventral fin originates immediately posterior to the opening of the vent tube, its height is 28% (20–32%) of tail total height. Neuromasts are not highlighted. The oral disc is laterally emarginated and 35% (32–44%) of body width. Labial tooth row formula (LTRF) is 2(2)/3. The second tooth row of the upper labium (A-2) is separated by a medial gap that is about one-half the length of each tooth series of A-2. Marginal and submarginal papillae are confined to the lateral corners of the anterior and posterior labia, defining wide anterior and posterior gaps in the oral disc. Jaw sheaths are finely serrated, the distal half is black, and the upper jaw sheath does not exhibit a median notch or convexity. The overall coloration of tadpoles in stages 31–38 consists of shades of tan and dark brown that produce a marbled or reticulated pattern. The iris is golden with black venations and two medial dark zones that give the impression of a longitudinal bar crossing the eye; the pupil is bordered by a yellow ring. The tail is more reticulated, with interspersed blotches of iridocites and melanocites. The venter is dark, with abundant blotches of iridocites, but the gut is distinctly visible through the translucent skin.

Habitat (Fig. 3).—We found tadpoles on the bottom of an outlet of the very shallow and lentic edge of the river, where larvae took refuge under some decaying submerged leaves and vegetal debris. They were congregated but did not form schools. Larvae were difficult to see when resting on the muddy substrate. The river was covered by gallery forest. We saw toadlets jumping on pebbles a few meters from the river. We found tadpoles of the Hispaniolan Laughing Treefrog (*Osteopilus dominicensis*) together with those of *P. guentheri*.

Comparisons.—The tadpoles of the two other Hispaniolan congeners, the Hispaniolan Crestless Toad (*P. fluviatica*)

Fig. 3. Breeding habitat of *Peltophryne guentheri* in the Río Gurabo, Santiago Rodríguez Province, Dominican Republic. Photograph by Sixto J. Incháustegui.

and the Eastern Crested Toad (*P. fracta*), remain unknown. Rivero et al. (1980) commented that the gut is not visible through the belly skin in tadpoles of *P. lemur*, which differs from the condition in *P. guentheri*. The larvae of the Cuban toads exhibit a very diverse morphology (Díaz and Cádiz, 2008). Only in coloration are tadpoles of *P. guentheri* somewhat similar to those of the Cuban Small-eared Toad (*P. empusa*) and Cuban High-crested Toad (*P. gundlachi*), both of which have taller bodies, two evident pale patches at both sides of the body terminus very close to the base of the vent tube, caudal musculature with a more concave dorsal outline, and bellies not conspicuously pale mottled. Tadpoles of these two Cuban species are always associated with temporary pools in open areas. Additionally, tadpoles of *P. empusa* have fewer, more enlarged and very pointed serrations in the jaw sheaths. Larvae of *P. guentheri* differ from those of the introduced Cane Toad (*Rhinella marina*; Fig. 4) in having a paler coloration (almost entirely black in *R. marina*), a more rounded snout, more ventrally directed mouth (more anteroventral in *R. marina*), and mottled or vermiculated fins (unpigmented or with clouds of melanocytes that never define a blotched or marbled pattern in *R. marina*). Also, larvae of *R. marina* frequently congregate to form schools.

We are aware that tadpole morphology is variable depending on ecology and that our results are limited to only one locality. However, this description is a preliminary

Fig. 4. Larvae of the introduced Cane Toad (*Rhinella marina*) are almost entirely black, have a more pointed snout, a more anteroventrally directed mouth, and fins that are unpigmented or with clouds of melanocytes that never define a blotched or marbled pattern. Also, larvae of *R. marina* frequently congregate to form schools. Photograph by Luis M. Díaz.

approach to an unknown aspect of the biology of this species that could be useful as a baseline for further studies on the topic.

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