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The tadpole of *Elachistocleis cesarii* Miranda-Ribeiro, 1920 (Anura, Microhylidae)

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The genus *Elachistocleis* Parker currently comprises 13 species widely distributed from Panama to central Argentina, east of the Andes (Caramaschi 2010). Because most species are difficult to diagnose and several currently recognized species might represent more than one lineage, tadpoles can contribute to the resolution of taxonomic problems (Rossa-Feres & Nomura 2006).

Tadpoles used in the present study were collected at Escola Agrícola de Jundiaí (5º 53' 06.68''S 35º 22' 01.28''W), municipality of Macaíba, Rio Grande do Norte State, Brazil, in June 2010 and March 2011 (collection permits by IBAMA/SISBIO #15363–1). We took two amplexing pairs to the laboratory, where they spawned and allowed us to confirm the identity of tadpoles collected previously in field. Adult frogs were later identified by U. Caramaschi and deposited at the Coleção do Laboratório de Anfíbios e Répteis da UFRN (CLAR-UFRN, AAGARDA 2473, 2474) and Coleção do Museu Nacional (AAGARDA 2471, 2472, Museu Nacional numbers not yet available). We anesthetized tadpoles in 10% ethanol and preserved them in 10% formalin. We took morphometric measurements from fifteen tadpoles at stage 27 and eighteen at stages 32–34 (Gosner 1960) and described them using the terminology and measurements from Altig and McDiarmid (1999). The variables used in this work are listed in Table I. All measurements shown are in millimeters and were taken using a Mytutoyo digital caliper (0.01 mm precision). A voucher lot of tadpoles at stage 27 used in the description was deposited at Museu de Zoologia da Universidade de São Paulo (MZUSP 145201). The tadpole used in the description was deposited under the voucher number MZUSP (145200). The remaining tadpoles are deposited at CLAR-UFRN (AAGARDA 3734).

Description. The body is slightly depressed dorso–ventrally and oval in dorsal and ventral views, with a triangular aspect in lateral view (fig. 1A, B, C). The snout is truncated in lateral view, and rounded in dorsal and ventral views. Eyes are small, located in the anterior third of body and positioned laterally. Nares are absent. A single ventral and medial spiracle, with a wide opening located in the last third of the body, sometimes covering the opening of the cloacal tube. The cloacal tube is short, medial, with the opening directed ventroposteriorly and fused with the ventral fin, without a free margin. The oral disc opening is terminal, without keratinized parts or papillae, and with short and paired semicircular dermal flaps in front of the mouth (Fig. 1D). The caudal musculature is moderately developed, tapering gradually to the posterior region. The maximum height of the ventral fin is slightly larger than the dorsal fin. The dorsal fin originates at the body and tail junction and gradually tappers anteroposteriorly to the tip of the tail. The lower tail fin margin is parallel to the body axis until the middle of the tail, after which it converges towards the tail tip.

Coloration. In life, body ranges from dark to light brown on the dorsal region, while lightly pale and slightly transparent on the ventral region. The dorsal and lateral regions present numerous dots, present in smaller numbers on the ventral region. The viscera are partially visible, and the tail has the same color patterns of the body. Pigmentation of the ventral edge of the fin scarce or absent, but always present on the dorsal edge.

Variation. We observed that *E. cesarii* tadpoles vary in body and tail muscle coloration according to development stage. In early stages the tadpoles present light pale pigmentation different from the tadpoles of advanced stages that present a dark brown pigmentation. Also, a thin light stripe in the first third of the tail occurs in some individuals in advanced stages.

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Natural history notes. *Elachistocleis cesarii* larvae and calling adult frogs were found within the study area in a temporary pond near rocks or plant leaves and roots during the raining season. They do not aggregate when fully developed, but were observed forming small groups right after eggs hatched in the laboratory. We also collected tadpoles of *Dendropsophus nanus*, *Hypsiboas albomarginatus*, *H. raniceps*, *Leptodactylus vastus*, *L. macrosternum*, *Physalaemus cuvieri* and *Scinax x-signatus* in the same environment.

TABLE 1. Morphometric measurements (in mm) of *Elachistocleis cesarii* tadpoles (mean ± standard deviation).

Measurements	Stage 27 (N=15)	Stage 32–34 (N=18)
Total Length	15.9 ± 1.1 (14.0–17.6)	23.0 ± 3.3 (18.4–27.1)
Body Length	7.2 ± 0.4 (6.3–8.0)	9.1 ± 1.7 (7.0–11.6)
Body Height	4.2 ± 0.5 (4.0–5.0)	5.1 ± 1.3 (3.4–7.0)
Body Width	6.0 ± 0.7 (5.0–7.0)	6.5 ± 1.1 (5.0-8.4)
Tail Length	8.7 ± 1.1 (6.7–10.3)	13.8 ± 1.4 (10.3–16.0)
Maximum Tail Height	3.1 ± 0.6 (2.3–3.8)	5.7 ± 1.9 (3.9–7.7)
Tail Muscle Height	1.5 ± 0.2 (1.1–1.7)	2.6 ± 0.6 (1.8–3.3)
Tail Muscle Width	0.9 ± 0.1 (0.6–1.1)	1.6 ± 0.5 (1.0–2.4)
Eye Diameter	0.8 ± 0.1 (0.7–0.8)	1.1 ± 0.1 (1.0–1.3)
Interorbital Distance	5.3 ± 0.5 (4.3–5.9)	6.8 ± 1.1 (5.7–8.2)
Eye-Snout Distance	3.3 ± 0.2 (3.1–3.5)	4.7 ± 0.5 (3.8–5.4)
Spiracle Length	1.2 ± 0.1 (1.0–1.4)	2.0 ± 0.6 (1.2–2.9)
Cloacal Tube Length	0.3 ± 0.1 (0.3–0.4)	0.7 ± 0.2 (0.4–1.1)
Mouth Width	2.2 ± 0.3 (1.9–2.8)	2.9 ± 0.8 (1.7–4.0)

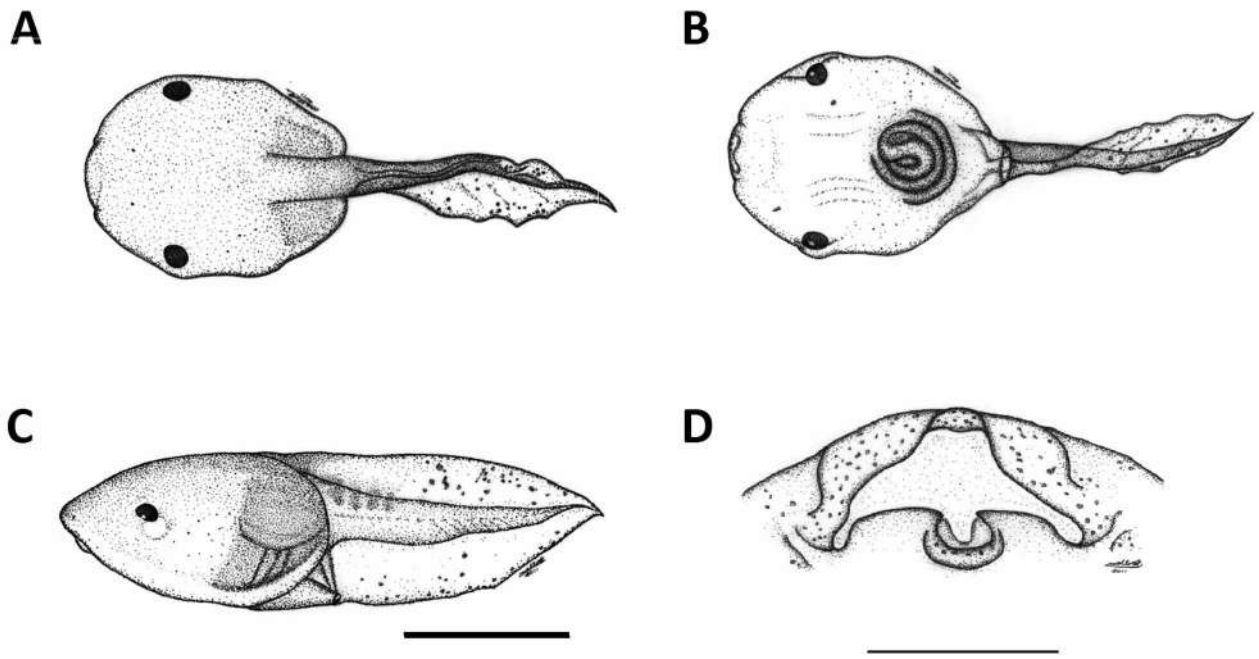

FIGURE 1. Tadpole of *Elachistocleis cesarii* at stage 27 (Gosner, 1960). (A) Dorsal, (B) ventral, and (C) lateral views (scale=5mm); (D) oral apparatus (scale=1mm).

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The morphology of *E. cesarii* tadpoles resembles other tadpoles described for the group, such as *E. bicolor* (Rossa-Feres & Nomura 2006; Williams & Gudynas 1987), an undescribed species from a population in the municipality of Vitória Brasil, São Paulo state (Rossa-Feres & Nomura 2006, herein referred to as *Elachistocleis* sp.), *E. erythrogaster* (Kwet & Di-Bernardo 1998), and *E. ovalis* and *E. surinamensis* from Trinidad (Kenny 1969). Main characters shared are: body triangular in lateral view and oval in dorsal and ventral views; eyes arranged laterally; single spiracle; oral apparatus lacking keratinized of parts or papillae, and paired dermal flaps in front of the mouth opening. The tadpole of *E. cesarii* is distinguished from the tadpole of *E. bicolor* and *E. ovalis* by the morphology of the dermal flap, which is short and semi–circular in *E. cesarii* and circular and expanded in *E. bicolor* and *E. ovalis.* Furthermore, the tadpole of *E. bicolor* has a light stripe between the eye and snout (Rossa-Feres & Nomura 2006) not seen in the tadpole of *E. cesarii*. *Elachistocleis cesarii* tadpoles differ from *Elachistocleis* sp. and *E. surinamensis* by the morphology of dermal flaps, which are jagged, circular and expanded in *Elachistocleis* sp. and *E. surinamensis* and not jagged, short and semi–circular in *E. cesarii*. *Elachistocleis* sp. has stripes and bright spots between the eye and snout also absent in the tadpole of *E. cesarii*. There are no characters that unequivocally distinguish tadpoles of *E. erythrogaster* from *E. cesarii* but not all variables used in the present work were used in its description (Kwet & Di-Bernardo 1998). Considering recent taxonomic revisions and species descriptions (Caramaschi 2010; Lavilla *et al.* 2003; Toledo *et al.* 2010), knowledge of the larvae for the genus is still incipient, and the present study contribuites only fifth tadpole description of *Elachistocleis*.

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