



A survey of the internal oral features and external morphology of *Physalaemus* larvae (Anura, Leptodactylidae)

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Abstract

There are 45 species currently described for the genus *Physalaemus* that are allocated into seven morphological groups and 29 of them have their tadpoles described, of which 12 have information on their internal oral anatomy. In order to help resolving taxonomic and systematic problems, tadpoles from this genus had their external and internal oral morphologies studied, described and compared. During this study, it was noticed that different terms are sometimes used to refer to the same character and a standardized nomenclature is suggested. This study is divided into two parts. First, we describe the oral cavity anatomy of the tadpoles of *Physalaemus aguirrei*, *P. atlanticus*, *P. camacan*, *P. cicada*, *P. gracilis*, *P. irroratus*, *P. maximus*, *P. rupestris*, *P. signifer* and *P. soaresi*. Second, we present a comparison among tadpoles of these ten species plus the tadpoles of *P. albifrons*, *P. angrensis*, *P. centralis*, *P. crombiei*, *P. cuvieri*, *P. henselii*, *P. jordanensis*, *P. marmoratus*, *P. moreirae* and *P. spiniger*. This study adds information on tadpoles of the genus *Physalaemus* that corroborates some of the species groups proposed for adult specimens, but also shows that although they have a typical pond-living external morphology, being very similar to one another, the oral disc and the internal oral morphologies present many features with interspecific variation that may be used to identify the specimens.

Key words: systematics, larval anatomy, external anatomy, internal oral anatomy

Introduction

The Neotropical genus *Physalaemus* Fitzinger belongs to the subfamily Leiuperinae according to Pyron and Wiens (2011), and comprises small-sized frogs widely distributed from northern to central Argentina, eastern Bolivia, Paraguay, Uruguay, Brazil, the Guianas, lowlands of southern Venezuela, southeastern Colombia, and western Ecuador (Frost, 2011). Currently, there are 45 recognized species in the genus allocated into seven morphological groups based on characteristics of the adults (Nascimento *et al.*, 2005), 29 with the tadpole described.

These larvae are typical pond-living tadpoles that are assumed to occur in the bottom of these lentic water bodies (Rossa-Feres *et al.*, 2004; Vera Candiotti, 2007) and are very similar to one another regarding to their external morphology (Vieira & Arzabe, 2008).

For 13 of the 30 tadpoles described in the genus, there is information upon the internal oral morphology: *P. santafecinus* and *P. biligonigerus* (Perroti & Céspedes, 1999); *P. riograndensis* (Sandoval, 2002); *P. lisei* (Both *et al.*, 2006) *P. marmoratus* (Nomura *et al.*, 2003); *P. fernandezae* (Alcade *et al.*, 2006), *P. albonotatus*, *P. centralis* and *P. cuvieri* (Miranda & Ferreira, 2009), *P. jordanensis* (Gomes *et al.*, 2010), *P. albifrons* (Oliveira *et al.*, 2010), *P. moreirae* (Provete *et al.*, 2011), and *P. angrensis* (Ruggeri *et al.*, 2011). According to Wassersug (1976, 1980), the oral cavity of the tadpoles is characterized by having many papillae whose arrangement, length, and number differ among genera and species and contain important information that may contribute on the understanding of the systematic of anuran groups (Spirandeli-Cruz, 1991; d'Heursel & de Sá, 1999).

In order to provide new features that allow the differentiation of tadpoles of this genus, herein we analyze 20 species from all seven morphological groups and we compare the external morphology, the oral morphology and the internal oral cavity morphology of these tadpoles, suggesting a standardized nomenclature by listing the most relevant characters that should be considered in descriptions.