



The tadpoles and advertisement calls of *Pleurodema bibroni* Tschudi and *Pleurodema kriegi* (Müller), with notes on their geographic distribution and conservation status (Amphibia, Anura, Leiuperidae)

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Abstract

Pleurodema bibroni and *P. kriegi* are poorly known species with a troublesome taxonomic history. They are cryptic taxa, currently considered as valid species on the grounds of biogeographic and ecological differences. The first is known from much of southern Uruguay and from the northeastern region of the State of Rio Grande do Sul, Brazil (from sea level to 900 m a.s.l.); the latter is restricted to high grasslands of the Sierras Grandes in central Argentina, between 800–2000 m a.s.l. Herein, we compare their tadpoles and advertisement call and provide some notes on their conservation status and natural history. The tadpoles of both species are very similar, belonging to the benthic ecomorphological guild, and are characterized by: total length about 35 mm at stages 33–36; globose body; short lateral sinister spiracle posterodorsally directed; pineal end organ visible between the eyes; medial vent tube, with its opening aligned with the ventral fin, directed to the left or to the right; vent tube enclosed in a transparent saccular structure underlying the limb buds; tail length about 60% of the total length, with bluntly rounded tip; oral disc anteroventral, laterally emarginated, with very robust jaw sheaths and marginal papillae arranged in a single or double row with a large dorsal gap; labial tooth row formula 2(2)/3(1); gap in A2 wide with the upper jaw sheath partially placed within it; P3 about half the length of the other rows. The advertisement call exhibits the same temporal and spectral structure in both species. It consists of long trills (up to about 45–70 s) that are emitted sporadically; notes are about 0.044–0.062 s, separated by gaps of 0.024–0.058 s (note repetition rate 8.9–13.2/s) and have three pulses. Dominant frequency ranges between 1729 and 2162 Hz. Reproductive season of both species differed, autumn and winter for Uruguayan populations of *P. bibroni* and spring and summer for *P. kriegi*. Defensive encounter behavior (deimatic behavior) consisting in exhibition of the eye-like lumbar glands was documented in *P. bibroni* and *P. kriegi* (along with exposure of reddish flash coloration), and also in *P. borellii*, *P. bufoninum* and *P. thaul*. Similar behavior previously unreported for a *Pleurodema* species lacking noticeable lumbar glands was observed in *P. tucumanum*. The analysis of the literature, material in collections and fieldwork done by the authors over the last decade in Uruguay suggests that *P. bibroni* is undergoing severe decline. It was a common species up to the early 1970's, but few populations close to each other in southeastern Uruguay are the only ones currently known. The conservation status of *P. bibroni* is of major concern as most known remnant populations are located in coastal areas with an increasing impact of urbanization. In contrast, *P. kriegi* seem to have stable populations, many of them within protected areas.

Key words: amphibian decline, biogeography, defensive behavior, deimatic behavior, larval morphology, *Pleurodema borellii*, *Pleurodema bufoninum*, *Pleurodema thaul*, *Pleurodema tucumanum*

Introduction

The genus *Pleurodema* Tschudi, 1838, is currently composed of 13 species (Frost 2008), distributed in the Neotropical region mostly in areas with dry or arid climates (Barrio 1964a; Lynch 1971; Duellman & Veloso 1977; Cei 1980). Fossorial habits are known for most of them (Fernández & Fernández 1921; Fernández 1927; Carvalho & Bailey 1948; Barrio 1964a; Duellman & Veloso 1977) and many species have explosive reproductive strategies related to rainfall (Fernández & Fernández 1921; Barrio 1964a; León-Ochoa & Donoso-Barros 1969–1970; Hulse 1979; Cei 1980; Peixoto 1982; Hödl 1992; Cardoso & Arzabe 1993). Their reproductive modes include foam nests, submerged egg strings, floating egg strings, and floating egg masses (Cei 1962; Duellman & Veloso 1977; Barrio 1977; Cei 1980; Hödl 1992; Martori *et al.* 1994; Weigandt *et al.* 2004). Conspicuous lumbar glands are present in eight species, and deimatic behavior was reported for some of them (Cei 1962; Vaz Ferreira 1984; Martins 1989). At least a brief description of the external morphology of tadpoles is available for most species of *Pleurodema*, except for *Pleurodema bibroni* Tschudi and *Pleurodema fuscomaculatum* (Steindachner); the characters of those known larvae were summarized consecutively by Duellman and Veloso (1977), Cei (1980), Altig and Johnston (1986), and Altig and McDiarmid (1999b).

Pleurodema bibroni (Fig. 1A) and *Pleurodema kriegi* (Müller) (Fig. 1B) have troublesome taxonomic histories. *Pleurodema bibroni*, the type species of the genus, was described from Montevideo, Uruguay (Tschudi 1838) but this name was applied for a long time to specimens of Argentinean and Chilean populations currently known under the name *Pleurodema thaul* (Lesson) (Donoso-Barros 1969). On the other hand, *P. kriegi*