

## Anophthalmia in adults of two Amazonian treefrogs (Anura: Hylidae)

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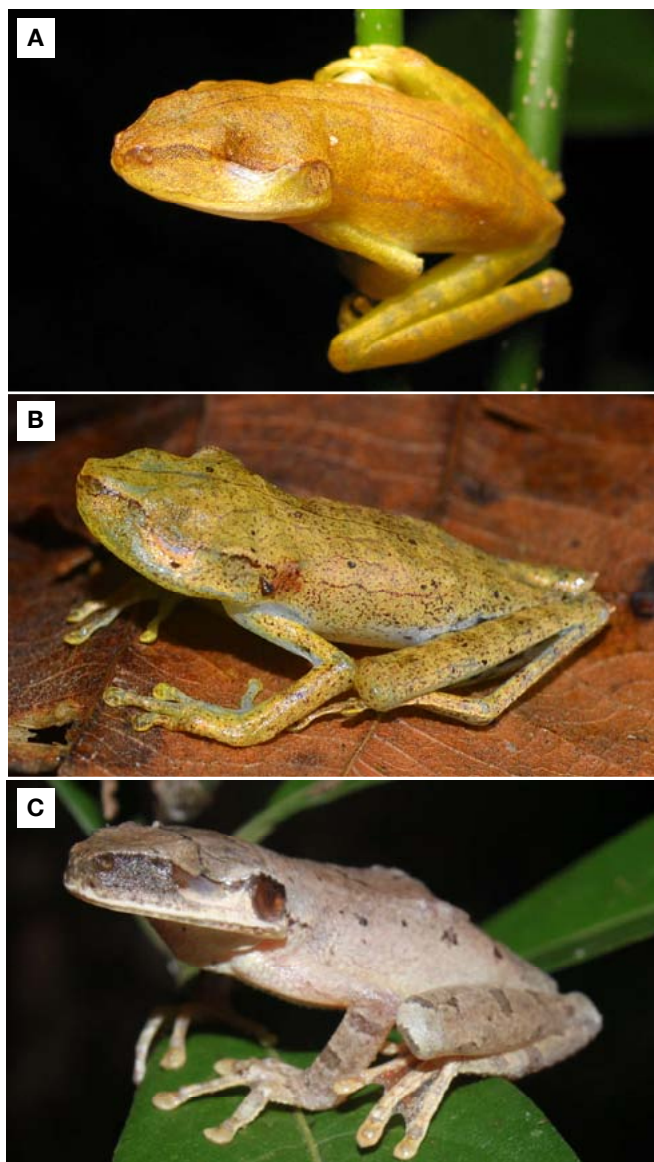
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A mong ocular deformities in anurans, anophthalmia is relatively common, characterised by the absence of one or both eyes (Meteyer, 2000). The absence of visual sense is highly detrimental, since sight is used for spatial perception, orientation, notion of depth, discrimination of barriers and surfaces, and location and selection of prey (Ingle, 1976). Some anurans also communicate by visual signaling, depending on vision during courtship, territorial and aggressive encounters (Toledo et al., 2007). Information about some abnormalities in frogs, as well as its causes are still little known and examples are rarely reported. In this note we report instances of two anuran species found without both eyes in different locations of the Brazilian Amazon.

On 19 December 2009, at 21:16 hrs, an eyeless adult *Hypsiboas fasciatus* (Fig. 1A) was recorded in an alluvial forest fragment (-5.205211°, -48.384711°) in Buriti do Tocantins, Tocantins state, Northern Brazil. The treefrog was found perched on a branch of a tree at 1.5 m above ground. This treefrog was not collected. On 5 January 2014, at 16:30 hrs, another eyeless adult *H. fasciatus* (Fig. 1B) was captured (ZUFG 8087) in a varzea forest (-8.632694°; -67.343083°) of the middle Purus River in Boca do Acre, Amazonas state, Northern Brazil. The treefrog was found perched on the branch of a bush at 1.0 m above ground. The identification of both *H. fasciatus* were performed according to the proposed by Caminer & Ron (2014). On 1 January 2016, at 18:51 hrs, an eyeless adult *Osteocephalus lepriurii* (Fig. 1C) was recorded in a riparian forest fragment (-10.267006°; -67.196667°) in Plácido de Castro, Acre state, Northern Brazil. The treefrog was perched on the branch of a bush at 0.4 m above ground. The frog was not collected. The identification of *O. lepriurii* was performed according to the proposed by Jungfer et al. (2013).

Examples of anophthalmia previously reported in anurans were believed to involve chemical pollutants in the environment originating from agriculture areas (Gurushankara et al., 2007; Guerra & Araújo, 2016), transgenerational and/or embryonic exposure to



**Figure 1.** Anurans with anophthalmia, missing both eyes, found in the Brazilian Amazon. **A** – *H. fasciatus* found in Buriti do Tocantins, Tocantins State; **B** – *H. fasciatus* found in Boca do Acre, Amazonas State; **C** – *O. lepriurii* found in Plácido de Castro, Acre State

petrochemical contaminants and metals (Bacon et al., 2013), trematode infection (Roberts & Dickinson, 2012), genetic incompatibility in hybrids (Smith et al., 2013), thyroid carcinomas (Cheong et al., 2000) and tyre debris (Mantecca et al., 2007). The absence of eyes can also be result of synergistic effects (Toledo & Ribeiro, 2009; Hayes et al., 2010; Bacon et al., 2013; Pizzatto et al., 2016). As multiple factors may interact to create anomalies, the causes of the conditions and survivorship of frogs in the wild state remain poorly understood.

Although vision has a fundamental role for anurans, frogs that are blind may orient themselves using the pineal complex, which responds to light stimuli (Cadusseau & Galand, 1980). However, although reaching the adult stage they appear unable to feed efficiently to maintain a good body condition (Pizzatto et al., 2016), which is especially important for arboreal anurans that may have sensory and neural capabilities that are not always found in terrestrial species (Wells, 2007). It is estimated, for example, that 88% of the prey of an arboreal species is obtained using visual detection and short pursuit (Freed, 1980). Therefore, we assume that to reach adulthood these blind individuals must have employed alternative feeding strategies.

The missing eyes in the three treefrogs recorded here seem to be a congenital feature but perhaps environmental conditions and biological characteristics of each species enabled the frogs to reach adulthood. However, abnormalities in anurans and their causes is not fully understood and further studies are required, in particular on to ascertain the possible effects of environmental degradation and disease in the decline of amphibian populations.

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