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SHORT COMMUNICATION

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Deformities in the Cuban spotted toad *Peltophryne taladai*: A rare case of abnormal eyes

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In the last decade, around the world observations of individuals in amphibian populations with some type of physical anomaly has become increasingly frequent (Lannoo 2008; Lunde & Johnson, 2012). In Cuba the occurrence of abnormal anurans has been sporadic, anecdotal, and has usually involved single specimens (García-Padrón & Alonso Bosch, 2017, 2019), which suggests that the rate of anomalous frogs in nature could be low. However, Alonso Bosch et al. (2017) reported that 45 % of 113 tadpoles of *Peltophryne fustiger*, collected in five localities of Pinar del Río and Artemisa provinces, had abnormal mouthparts such as missing tooth rows and lack of dark keratinisation of mouthparts. The cause for these anomalies remains unknown.

Peltophryne taladai (Schwartz, 1960) is one of fourteen native bufonids from the Caribbean islands (Hedges et al., 2019). It is a Cuban endemic toad, which has a disjunct distribution in Central, Central East and Eastern Cuba, from the sea level to 850 m a.s.l. (Díaz & Cádiz, 2008; Rivalta et al., 2014). This species is common in mesic and broadleaf forests, banana and cacao plantations; it has been sighted also in open cultivated areas. Usually, it occurs associated with small streams, rivers and ponds where it reproduces (Díaz & Cádiz, 2008; Henderson & Powell, 2009).

On 19th September 2012, during a short visit to Pinares de Mayarí region, Mayarí municipality, Holguín province, Cuba, we undertook a rapid nocturnal survey (21:00 h-23:00 h) along a small stream in the surroundings of Los Exóticos farm (20° 31´29.61" N 75° 49´14.20" W, WGS 84). Our sample included ten adult *P. taladai* (eight males, one female and one juvenile). Two individuals of these had facial or skeletal deformities. The sex was determined based on sexually dimorphic and behavioural characters (size, nuptial pads, vocal sac, advertisement calls). We collected data on snout-vent length (SVL) that was measured with a Vernier calliper (0.05 mm error) and mass (BM) with Pesola dynamometers (±2 g). The first specimen, an adult male *P. taladai* (SVL=128.55 mm, BM=132 g) exhibited rare anomalies in both eyes (Fig. 1A). This animal had an apparent hyperxanthism (overabundance of yellow pigments) in the right eye, and opacity (opacification of the eye lens or cataracts) of the left eye (Fig. 1B & C). The second malformed individual was also an adult calling male (SVL = 114.40 mm, BM=132.0 g) which had a case of polydactyly in the right foot, one of the most common skeletal anomalies reported in urodeles and anurans (Henle et al., 2017). Both animals were released at the site of capture.

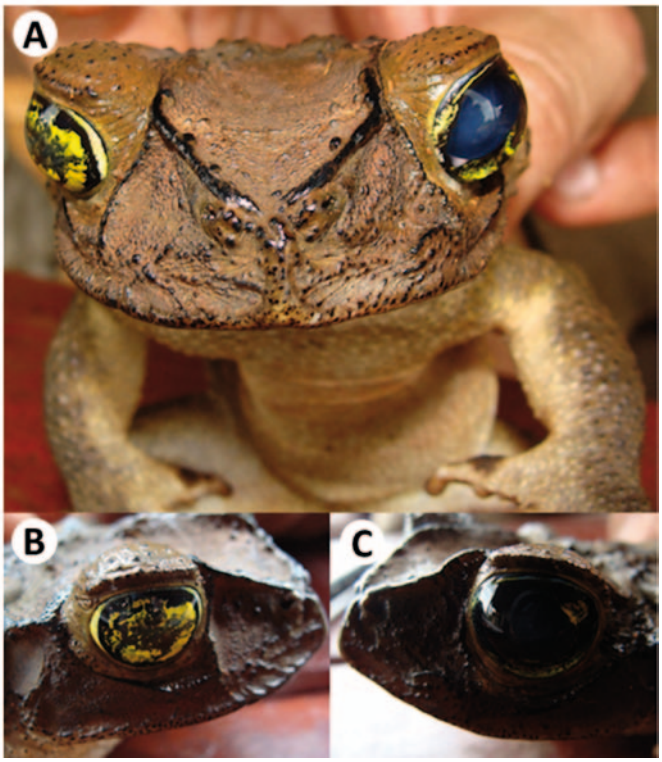

Figure 1. Malformed eyes of a male *Peltophryne taladai* - **A.** Front view showing anomalies in both eyes, **B.** Hyperxanthism of the right eye, **C.** Opacity or whitened left eye

Reports of ocular abnormalities (duplication, microphthalmia and anophthalmia) in adults and tadpoles of anurans have been widely documented (Henle et al., 2017; Brassaloti & Bertoluci, 2018; Mônico et al., 2019). Two of the most detailed studies have been on island populations of introduced toads (Anura, Bufonidae). In the Brazilian oceanic archipelago of Fernando de Noronha, Toledo & Ribeiro (2009) reported that the rates of malformed individuals of *Rhinella jimi* reached about 45 % of post-metamorphic (adult) individuals. About 20 % of the malformation cases were related to eye deformities, such as anophthalmia, palpebrae

malformation, and lack of coloured iris; inbreeding has been argued as a causative agent (Toledo et al., 2016). In the case of *Rhinella marina* introduced into the Bermuda islands, the incidence of abnormalities was high and widespread (Bacon et al., 2006) and included external facial, eye and limb abnormalities. In this case, environmental pollutants in pond sediments such as petroleum hydrocarbons, polycyclic aromatic hydrocarbons, metals (Al, As, Sn, Cd, Cr, Cu, Fe, Pb,Hg, Mn, Ni, and Zn), and ammonia, appear to be responsible (Fort et al., 2006; Bacon et al., 2013). In the two cases, the authors reported different types of ocular abnormalities; at least one of them (whitened eye) is similar to that reported for *P. taladai* in this study. To the best of our knowledge our observation of hyperxanthic eyes in an anuran has only been reported previously for *Rana arvalis* in Penza region of Russia (Svinin et al., 2018). However, this anomaly is probably widespread but usually occurs in combination with other more externally visible ocular malformations.

In spite of these malformations, no alteration in behaviour was detected in any of these toads. According to Tolledo & Toledo (2015), sight loss can impact the frequency of food acquisition and the prey types consumed, consequently blind toads may be handicapped in relation to normal ones in size and mass. However, according to our observations the body condition in the 'blind' Cuban spotted toad appeared to be optimal as its size and mass corresponded closely to the mean value (±SD) obtained for the males in this population (SVL=119.54 ± 8.75, BM=143.71 ± 35.03).

Further visits to the area will allow estimation the prevalence of these and other anomalies, as well as providing more information on the ecology, natural history and behaviour of the individuals of this population. An adequate research design that includes the analysis of water quality and the search for aquatic molluscs that could be intermediate hosts of encysted trematodes (*Ribeiroia*), recognised as responsible for the abnormalities in several amphibian species around the world (Johnson et al., 1999; Stopper et al., 2002), are needed. *Ribeiroia* has not been reported in any fresh water bodies in Cuba, but studies are required to determine whether or not Cuba fresh water snails are infected.

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