

Anophthalmia in two microhylid frogs, *Microhyla nilphamariensis* Howlader et al., 2015 and *Uperodon systoma* (Schneider, 1799), in Delhi, India

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By virtue of their characteristic biphasic partial aquatic life cycle, permeable skin, and shell-less eggs, amphibians are vulnerable to environment disturbances and hence have been considered excellent bioindicators of environment quality (Blaustein and Johnson, 2003; Gurushankara et al., 2007; Garcês et al., 2020). According to the International Union for Conservation of Nature (IUCN), amphibians are the most threatened vertebrate taxon, with 41% of amphibian species facing the threat of extinction (IUCN, 2022). The decline in amphibian populations, in tandem with the increase in reports of morphological anomalies, has raised important conservation-related concerns (Blaustein and Johnson, 2003; Sparling et al., 2015; Ascoli-Morrete et al., 2019). Abnormalities in amphibians, particularly anurans, have been reported since the 17th century (Ouellet et al., 1997; Ouellet, 2000; Johnson et al., 2010; Laurentino et al., 2016). But in the last few decades, higher rates of malformations, exceeding the baseline 0–2% natural abnormality frequency, have been observed in several parts of the world (Gurushankara et al., 2007; Johnson et al., 2010; Reeves et al., 2013; Laurentino et al., 2016).

Abnormality frequencies > 5% have been reported for a local population of frogs inhabiting the agroecosystems of the central Western Ghats of India (Gurushankara et al., 2007). Such anomalies could be due to genetic factors or caused by several environmental factors. Major implicated causes include agrochemicals (Schmidt, 1997; Ouellet, 2000; Gurushankara et al., 2007; Peltzer

et al., 2011; Sparling et al., 2015; Laurentino et al., 2016; Henle et al., 2017; Ascoli-Morrete et al., 2019; Hegde et al., 2019), parasitic infections (Ouellet, 2000; Johnson et al., 2010; Roberts and Dickinson, 2012), UV-B radiation (Blaustein and Johnson, 2003; Johnson et al., 2010), predation attempts (Martof, 1956; Ballengee, 2009; Laurentino et al., 2016), thyroid carcinoma (Cheong et al., 2000), heavy metals (Bacon et al., 2013; Bosch and Marrero, 2020), petrochemicals (Bacon et al., 2013; Bosch and Marrero, 2020), diseases (Ouellet, 2000), genetic mutations (Ouellet, 2000), hybridization (Haddad et al., 1990; Henle et al., 2017), inbreeding (Williams et al., 2008), or a combination of these factors (Reeves et al., 2013). Anophthalmia is one such abnormality, a craniofacial deformity defined by the absence of one or both eyes (Meteyer, 2000). Here, we report the first record of anophthalmia in frogs of the family Microhylidae from Delhi, the capital city of India.

During an amphibian survey in the residential campus of Indira Gandhi National Open University in Saket, New Delhi, India (28.4926°N, 77.2027°E, elevation 286 m) at 21:38 h on 2 July 2022, we came across an adult Marbled Globular Frog (*Uperodon systoma*) along the side of the road (Fig. 1D). Upon closer examination, we found that the individual was suffering from unilateral dextral anophthalmia, with the right eye and eye socket completely absent. The frog appeared healthy and showed no signs of any other morphological aberrations, reducing the probability of depredation as the cause.

During a similar amphibian survey in the Central Delhi ridge forest, Dhaula Kuan, New Delhi, India (28.5915°N, 77.1619°E, elevation 264 m) on 16 September 2015 at 20:30 h, we came across a late stage tadpole of the Nilphamarai Narrow-mouthed Frog (*Microhyla nilphamariensis*) in the grassy area near a temporary phytoplankton-infested pond in Jheel Park, very close to the Dhaula Kuan highway. The tadpole displayed sinistral anophthalmia. The animal was

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