



Hindlimb Malformation in a Bangladesh Skittering Frog, *Euphlyctis kalasgramensis* Howlader, Nair, Gopalan, and Merila 2015 (Anura: Dicroglossidae)

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Natural deformities among amphibians have been estimated to occur in less than five percent of individuals in populations in established habitats (Blaustein and Johnson 2003). However, malformations in animals also arise as a result of environmental contaminants, radiation, parasites, or predation, which disrupt normal development, especially during the larval life-stages of amphibians (Meteyer et al. 2000; Ouellet 2000; Ankley et al. 2002; Blaustein and Johnson 2003; Lunde and Johnson 2012). One of the most common abnormalities in frogs and toads is ectrodactyly, a specific condition involving the absence of digits (both metatarsals and phalanges) (Henle et al. 2017a).

The Bangladesh Skittering Frog (*Euphlyctis kalasgramensis*), a small species first described from Kalasgram, Bangladesh (Howlader et al. 2015), ranges throughout Bangladesh to Mizoram in northeastern India and Nepal at elevations below 2,500 m asl, and western Punjab in Pakistan and likely extending into Rakhine, Myanmar (Frost 2022). These frogs occupy permanent and ephemeral ponds, channels, and rice fields, and the breeding season lasts from March to August in Mizoram (as *Euphlyctis cyanophlyctis* in Lalremsanga 2011) and Nepal (Khatiwada et al. 2021) and from May through September in Punjab, Pakistan (Ali et al. 2020). On 20 November 2021, at an elevation of 778 m asl in a vernal pool at the Tamdil National Wetland in Mizoram, we encountered an adult male Bangladesh Skittering Frog (SVL 56 mm) (Fig. 1) completely missing tarsals and phalanges on its left hindlimb. The specimen was deposited and catalogued as MZMU2638 in the Departmental Museum of Zoology, Mizoram University, Aizawl, Mizoram, India.

Limb malformation is the most common abnormality in recently studied anuran populations in Mizoram, with hindlimb abnormalities described in three anurans species (the Tamenglong Horned Frog, *Xenophrys numhbumaeng*

[Siammawii et al. 2021a], Mawphlang Odorous Frog, *Odorrana mawphlangensis* [Siammawii et al. 2021b], and Nagaland Montane Torrent Toad, *Duttaphrynus chandai* [Siammawii et al. 2021c]).

Multiple reports have tied abnormalities in anurans to water contaminated with pollutants, pesticides, herbicides, retinoid and retinoid mimics, steroid-mimicking contaminants, petrochemicals, and metals, along with microbial diseases, parasitic infections, and ultraviolet radiation, all facilitated by effects of global warming (Kirk 1988; Hall and Henry 1992; Chambon 1993; Gardiner and Hoppe 1999; Marco et al. 1999; Johnson et al. 2001; Ankley et al. 2002; Hayes et al. 2002; Blaustein and Johnson 2003; Degitz et al.



Fig. 1. A Bangladesh Skittering Frog (*Euphlyctis kalasgramensis*) (MZMU2638) with a deformed hindlimb from the Tamdil National Wetland, Mizoram, India. Photograph by Lal Muansanga.

2003; Schoff et al. 2003; Lunde and Johnson 2012; Henle et al. 2017b; Monico et al. 2019). Also, *Ribeiroia ondatrae*, a trematode parasite, is known to trigger limb malformations in anurans (Rajakaruna et al. 2008; Szuroczki et al. 2012). Whether the malformation described herein and others discovered in Mizoram are natural genetic defects or were triggered by human factors remains unknown.

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