

SKIN TEXTURE CHANGE IN *DIASPORUS HYLAEFORMIS* (ANURA: ELEUTHERODACTYLIDAE)

CAMBIO DE LA TEXTURA DE LA PIEL EN *DIASPORUS HYLAEFORMIS* (ANURA: ELEUTHERODACTYLIDAE)

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Resumen.— La Rana Martillito de Altura, *Diasporus hylaeformis*, fue observada mostrando un cambio de textura de la piel durante una sesión fotográfica. Se ha sugerido que este comportamiento, reportado recientemente en anuros, puede servir como estrategia ante depredadores o factores de estrés. Esta es la primera vez que se reporta plasticidad en la textura de la piel de una rana del género *Diasporus*, y la tercera rana en general que se conoce con esta habilidad.

Palabras clave.— Rana martillito de altura, comportamiento de estrés, plasticidad fenotípica

Abstract.— The Montane Dink Frog, *Diasporus hylaeformis*, was observed showing a change in skin texture during a photo shoot. It has been suggested that this recently reported behavior in anurans may serve as an anti-predator defense or response to stress. This is the first time that this plasticity in skin texture is reported in a frog of the genus *Diasporus*, and the third frog in general that is known with this ability.

Keywords.— Mountain dink frog, stress behavior, phenotypic plasticity.

Phenotypic plasticity is the ability of an individual to change their physical characteristics under certain environmental factors (West-Eberhard, 2003). In anurans these changes can occur between growth stages, reproductive seasons, or due to sexual dimorphism (Wells, 2007). They usually occur over extended periods of a few months, however they can occur in short periods of time, mainly associated with changes in coloration (Bernard, 2004). However, there is little information on phenotypic plasticity occurring in small amounts of time. In fact, barely five years ago, the first report of phenotypic plasticity behavior in the skin texture of two anurans of the genus *Pristimantis* was described (Guayasamin et al., 2015). Although the function of this behavior is yet unknown, the authors suggest that this behavior could be highly distributed in the genus *Pristimantis*, or even in a greater number of anuran species. Here, I describe changes in skin texture in the Montane Dink Frog, *Diasporus hylaeformis*, in Costa Rica.

Diasporus hylaeformis lives in the highlands of Costa Rica and Panama, between 1500 and 2500 m.a.s.l. It is a small-sized tree frog species (22-27 mm) very common in open areas, pastures, and dense forests (Savage, 2002). Males call from the low vegetation, especially frequent on rainy nights. The color that individuals of *D. hylaeformis* present is variable: dark brown,

gray, reddish, bright orange, or yellowish, with or without scattered dorsal spots, and also there is a notable variation in coloration between day and night (Leenders, 2016). Although I had previously observed differences in the skin texture of *D. hylaeformis*, it was only until April 24, 2017 when I document an individual change from a tuberculated texture to a smooth skin in a few minutes. Observations were performed at around 20:00 h and 23:00 h using a digital camera (Canon Power Shot A1400) in a wooded area near the Poás Volcano National Park, Alajuela Province (10.16979° N, 84.20633° W; elevation 2220 m a.s.l.; WGS 84 datum). The individual had a very tuberculated skin in the form of spines on the head, back and extremities, of a darker color than that of the rest of the body (Fig. 1 A-C). After following and photographing the frog for 5-10 minutes approximately, it changed to a smooth skin and tubercles disappeared, until only darker spots were left in place (Fig. 1 D-F).

In the same location, several juveniles were present, and one exhibited remarkably rough and tuberculated spine like skin throughout the body (Fig. 2 A-C), but I couldn't keep watching to determine if its texture changes; conversely, other individuals showed evident smooth skin (Fig. 2 D-E). After taking the photographs no individuals were collected. Some animal behaviors go unnoticed for a long time until a researcher observes



Figura 1. Textura de la piel en un individuo de *Diasporus hylaeformis*. A-C: piel con abundantes tubérculos puntiagudos en todo el cuerpo. D-F: piel lisa en el dorso y extremidades, solo pequeños tubérculos supraciliares.

Figure 1. Skin texture of one individual of *Diasporus hylaeformis*. A-C: skin with abundant pointed tubercles throughout the body. D-F: smooth skin on the back and extremities, only small supraciliary tubercles.

it and makes the first report; then, it can become a recurring observation thanks to that first report which triggered the alerts of the researchers and made them more insightful. This is the case of the phenotypic plasticity in anuran skin. This plasticity in behavior has been reported in other groups of animals, of which the most notable is these present in some species of cephalopods, which use change of skin texture and coloration to mimic with the environment (How et al., 2017). Change in physical appearance occur in many species of amphibians that inflate their body for protection, to avoid being predated, and appear larger; this behavior is called “puffing up the body” and causes a skin tightening in amphibians (Toledo et al., 2011), and this mechanism could possibly lead to a change in the texture of

the skin. Texture changes in the skin may be related to stress, moisture or camouflage with the environment (Allen et al., 2014; Guayasamin et al., 2015). Changes in the environment or the presence of predators can generate stress levels that force the amphibian to change some behaviors (Bernard, 2004), include skin texture. *D. hylaeformis* has the ability to change its skin texture similarly to the reported by Guayasamin et al. (2015). This is the first report of skin texture change in the genus *Diasporus*, possibly supporting the hypothesis of this behavior being convergent, and could be present in other lineages of frog species.



Figura 2. Textura de la piel en diferentes individuos de *Diasporus hylaefarmis*. A-C: piel de un individuo juvenil mostrando una textura tuberculada en todo el cuerpo. D-E: adulto con la piel uniformemente lisa.

Figure 2. Skin texture in different individuals of *Diasporus hylaefarmis*. A-C: skin of a juvenile individual showing a tuberculated texture throughout the body. D-E: adult with uniformly smooth skin.

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