

GEOPHAGY: *BUFO MARGARITIFER* (ANURA: BUFONIDAE)

BUFO MARGARITIFER (South American Common Toad). **GEOPHAGY.** The *B. margaritifer* complex is widely distributed in Latin America, it is known throughout the Amazon Basin and parts of Panama (IUCN, Conservation International, and NatureServe. 2004. Global Amphibian Assessment. <www.globalamphibians.org>. Accessed on 27 December 2004). This taxon is abundant within the area of the Tiputini Biodiversity Station – Universidad San Francisco de Quito, Yasuní Biosphere Reserve, Napo Province, Ecuador (00 38'18" S, 76 08'56" W). The diet of this species consists primarily of large ants (>17mm) and beetles, along with other single prey items (Duellman 1978. Misc. Pubs. Mus. Nat. Hist., Univ. Kansas 65: 1-352). We observed the practice of geophagy, the consumption of soil, by *B. margaritifer* in the wild and this may represent the first report of geophagy in an anuran.

Geophagy has been observed in mammals, birds, reptiles, butterflies and isopods on every continent except Antarctica (Brightsmith 2004. Wilson Bulletin 116: 134-145). Six explanations for the practice of geophagy currently exist; decrease hunger, provide grit to aid in grinding food in the stomach, buffer stomach content, prevent diarrhea by adsorbing the toxins

released by bacteria and parasites, provide mineral supplementation and to adsorb secondary plant toxins (Diamond 1998. Discover 19:70-75). For vertebrates, geophagy is primarily practiced by herbivores and some omnivores (Brightsmith 2004. Wilson Bulletin 116:134-145).

On 02 November 2002 ca. 21:00 h, a *B. margaritifer* was observed with its mouth open in a patch of mud along a trail in *terra firme* lowland rainforest (Fig. 1). The individual was observed closing and retracting the eyes into the orbit, in the typical fashion of anurans when swallowing. The individual was removed and placed ca. 1m from the mud, it proceeded to return to the mud and continue consumption. It was photographed and low-res video taken of the behavior. Upon return, ca. 1.5 hr later, the individual was in the same location and appeared to still be consuming the mud, although its head was now beneath the surface of the mud and hence, retraction of the eyes could not be observed. On 22 June 2004 at 12:03 h, a second *B. margaritifer* was observed head down in a small mud puddle on a trail in *terra firme* lowland rainforest. The individual was observed raising its head from the surface of the water and then lowering it and placing its mouth at

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the edge of the mud puddle. On 06 July 2004 at 00:31 h, a third *B. margaritifer* was observed with its head down in a mud puddle with hindlimbs dramatically vertical in the air along a trail in várzea (seasonally-flooded lowland rainforest). When removed from the mud puddle this same individual moved immediately back to the puddle and returned to the same position, forcibly pushing its head into the muddy bottom of the puddle using its forelimbs and hindlimbs (Fig. 2). On 11 August 2004 at 17:40 h, a fourth *B. margaritifer* was observed in a mud puddle of a trail in várzea forest, its head pressed into the muddy edge just below the surface of the water.

Adult anurans are not known to drink water, except when subjected to particular physiological stresses in a laboratory situation (Duellman and Trueb 1994. *Biology of Amphibians*. 198p; Stebbins and Cohen 1995. *A Natural History of Amphibians*. 105p). In the genus *Bufo*, the highly vascularized dermis of the ventral pelvic region is the primary area identified for water absorption (Duellman and Trueb 1994. *Biology of Amphibians*. 198p). This morphological adaptation, the observed behavior and current explanations of

geophagy lead to our working hypothesis that here, the practice of geophagy is for the purpose of neutralizing the toxins acquired in their primarily ant diet. Taxa within the order Hymenoptera, particularly ants, have been found to be the most toxic members of the insect world (Meyer 1996. *Most Toxic Venom*. Chapter 23 in *University of Florida Book of Insect Records*, 2005. <<http://ufbir.ifas.ufl.edu/>>). This may represent a mechanism for coping with ants as a primary dietary resource.

We thank Bejat McCracken for photography, videography and field assistance, Paul Herbertson of King's College - London for field assistance, David Romo and Kelly Swing of the Tiputini Biodiversity Station, Universidad San Francisco de Quito, Ecuador. Financial support provided by the TADPOLE Organization.

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FIG. 1. *Bufo margaritifer* consuming mud from a trail in *terra firme* lowland rainforest.



FIG. 2. *Bufo margaritifer* returning to puddle after being removed and forcibly pushing its head into the muddy bottom of the puddle using its forelimbs and hindlimbs.