

Myiasis on a Neotropical leaf frog *Agalychnis saltator* Taylor, 1955

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Parasitism is a trait exhibited throughout multiple phylogenetic groups within the insect order Diptera and has evolved a diversity of forms, affecting a myriad of host organisms worldwide (Feener and Brown, 1997). One form, myiasis, occurs when dipterous larvae invade the tissue of a living vertebrate host (Zumpt, 1965). Myiasis-causing flies are exceedingly diverse in biology, ecology, and life history, ranging from obligate, host-specific parasites to facultative, opportunistic parasites, and can have a benign to lethal impact on their host (Stevens et al., 2006). Although most commonly studied in humans and domestic animals, various other wild mammals, birds, reptiles, and amphibians are known hosts for myiasis-causing dipterans (Hall and Wall, 1995; Stevens et al., 2006).

Three dipteran families are known to cause myiasis in anurans, with cases reported from Europe, North America, Australia and New Guinea, India, Central America, and South America (Kraus, 2007). Sarcophagidae and Calliphoridae are distributed throughout both the Old and New World, while Chloropidae is restricted to Australia and the Papuan region (Kraus, 2007). Although well documented in the literature, the majority of these records have been from the Nearctic, Palearctic, and Australasia. In the Neotropics, there is a paucity of knowledge on the myiasis-causing dipterans and the anurans they are known to parasitize. Only 11 (26%) of all known anuran species and three (19%) of all known dipteran species identified in this specific host-parasite interaction are known from this region, yet, this area is one of the richest in the world for these two groups of

organisms (Kraus, 2007; Eaton et al., 2008; Eizemberg et al., 2008; Mello-Patiu and Luna-Dias, 2010; Gaston, 1991; Duellman, 1999). Here we report the first case of myiasis on the Neotropical anuran *Agalychnis saltator* Taylor, 1955.

On July 30th 2007, at 8:05 p.m., while conducting a nocturnal stream transect as part of a herpetofaunal survey in the Kipla Sait Tasbaika indigenous territory, Reserva de la Biósfera Bosawas, Departamento Jinotega, Nicaragua (14.3878°N, 84.9799°W; elevation 180 m), we collected an adult *Agalychnis saltator* (Fig. 1; Florida Museum of Natural History (UF) 156023; 55 mm SVL). The surrounding habitat was primary broadleaf rainforest, part of the Lowland Moist Forest formation (Holdridge, 1967). *Agalychnis saltator* is a nocturnal canopy dweller that inhabits undisturbed rainforest along the Atlantic versant of Central America from northeastern Honduras to southeastern Costa Rica (Savage 2002). The specimen was found active 2 m above ground sitting on a leaf, and was alert and apparently healthy when collected. The following day it was preserved in a 10% formalin solution and later transferred to 70% ethanol.



Figure 1. Adult *Agalychnis saltator* (UF 156023) from Kipla Sait Tasbaika indigenous territory, 180 m elevation, Reserva de la Biósfera Bosawas, Nicaragua (photo by SLT).

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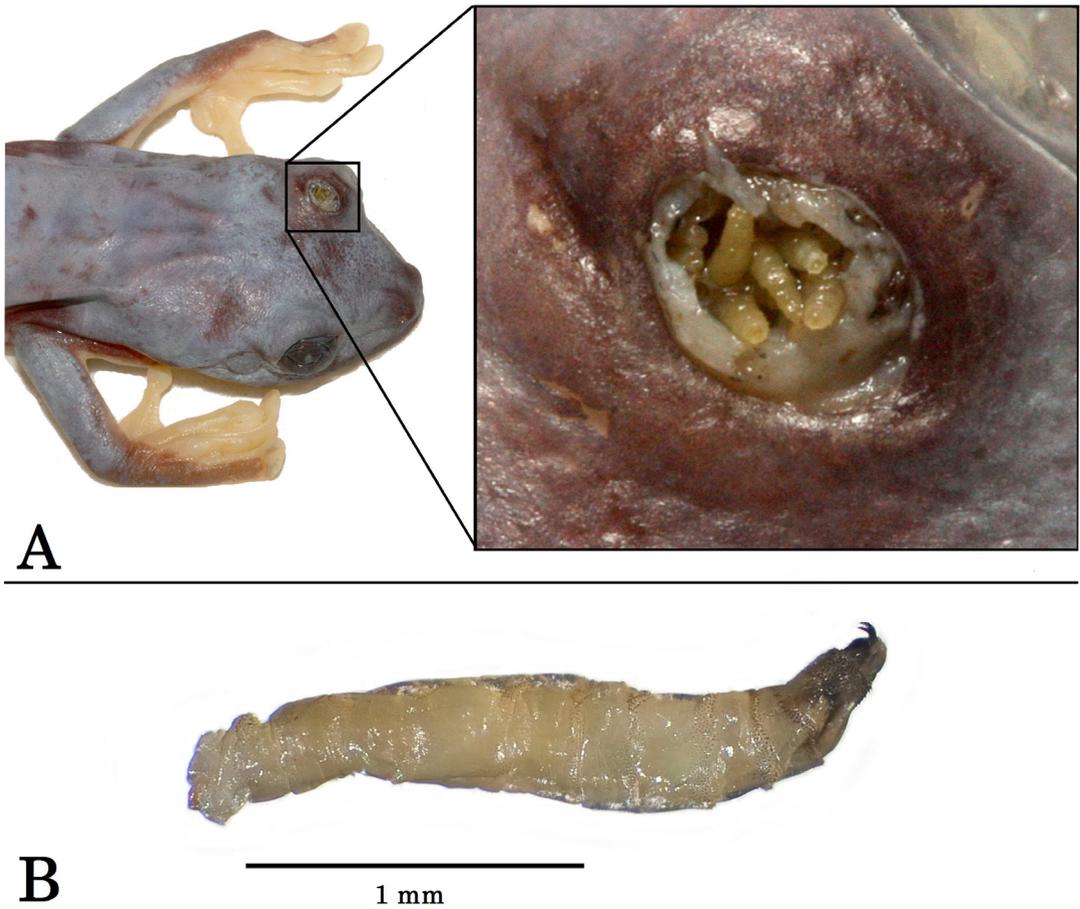


Figure 2. A. Close-up view of abscess containing 11 dipteran larvae above and behind the eye of an *Agalychnis saltator* (UF 156023). B. One of the dipteran larva removed from the abscess in Fig. 2A.

When the specimen was collected we noticed an abrasion above the left eye, which, at the time, was overlooked and thought to be a minor wound or scratch. Upon closer inspection of the specimen, we realized the abrasion was actually a deep open wound infested with dipteran larvae (Fig. 2). The abscess measured 1.3 mm in diameter and contained 11 first instar dipteran larvae (1.5-2 mm in length). Unfortunately, because the larvae were in such an early stage of development, identification to family-level or beyond was not possible.

In the Neotropics, only Sarcophagidae is known to cause myiasis in anurans. When identification of larvae was possible, the species most commonly reported was *Lepidodexia (Notochaeta) bufonivora*, which appears to be an obligatory parasite on a variety of anuran species belonging to multiple families (Crump and Pounds, 1985), including the Brazilian hylid *Aplastodiscus arildae* (Eizemberg et al., 2008). Also known from

the region is the sarcophagid *L. centenaria*, a recently described species from Brazil reported to infect the hylid *Hypsiboas beckeri* (Mello-Patiu and Luna-Dias, 2010). From Peru, *Sarcodexia lambens* was reported from the dendrobatid *Ameerega trivittata*, but this species of sarcophagid is probably more opportunistic in host selection as it is known to parasitize other groups of organisms as well (Hagman et al., 2005). Elsewhere in the world, records of hylid myiasis are known from temperate North America and Europe (Calliphoridae) and Australia (Chloropidae) (Kraus, 2007; Eaton et al., 2008).

Our record not only constitutes the first case of myiasis for *Agalychnis saltator*, but the first record of anuran myiasis from Nicaragua, the first from a hylid in Central America, and the first from a phyllomedusine and third from a hylid in the Neotropical region. Unfortunately, very little research has focused on the ecology of this

host-parasite interaction. As previously stated, the breadth of host specificity amongst dipterans that cause myiasis in anurans can vary greatly (Crump and Pounds, 1985; Hagman et al., 2005; Kraus, 2007; Mello-Patiu and Luna-Dias, 2010). Prevalence of infection within an anuran community and virulence to the host also varies among parasites. Infections from certain chloropids have shown to have a high prevalence but are typically non-lethal to the host (Kraus, 2007), whereas sarcophagid and calliphorid infections almost always yield a fatal result for the host but are probably less prevalent (Crump and Pounds, 1985; Bolek and Coggins, 2002; Bolek and Janovy, 2004); however, systematic surveys on prevalence and virulence are few. Future research into these ecological relationships, especially in the Neotropics, would provide an invaluable contribution to our knowledge on these little known host-parasite interactions.

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