

Journal of the Arkansas Academy of Science

Volume 69

Article 19

2015

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Recommended Citation

Thigpen, C. S.; Trauth, S. E.; and Marsico, T. D. (2015) "Case of Frugivory in a Green Treefrog (*Hyla cinerea*) from Northeastern Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 69 , Article 19.

Available at: <http://scholarworks.uark.edu/jaas/vol69/iss1/19>

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A Case of Frugivory in a Green Treefrog (*Hyla cinerea*) from Northeastern Arkansas

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Running Title: Frugivory in a Green Treefrog

Abstract

An adult green treefrog (*Hyla cinerea*) was collected in mid-September 2014 from Jonesboro, Craighead County, Arkansas. Contents included the remains of a beetle and two fruits. The contents were photographed, measured, and identified to the lowest achievable taxonomic level. The beetle was identified as a spotted cucumber beetle (*Diabrotica undecimpuncta howardi* Barber [Coleoptera: Chrysomelidae]). The fruits were identified as *Persicaria* sp. (likely *P. punctata* (Elliot) Small; Polygonaceae) and *Oryza sativa* L. (Poaceae). Fruits in the stomachs of frogs are rarely reported in the literature, but could represent possible mechanisms for seed dispersal in plants. It is unknown if frogs select to sometimes eat fruits or if fruits are a by-product of animal prey capture or missed predation attempts. In any case, the goal of this report is to raise awareness of a poorly documented phenomenon in an effort to direct attention to this possible method of seed dispersal.

Introduction

Amphibians are generally opportunistic carnivores and will eat anything they can swallow (Duellman and Trueb 1986, Stebbins and Cohen 1995). In most cases, visual stimuli induce a feeding response, but not much is known about prey selection and foraging strategies (Duellman and Trueb 1986, Stebbins and Cohen 1995). When pursuing prey, an amphibian may incidentally ingest non-prey material such as sediment or plant matter (Korschgen and Moyle 1955, Linzey 1967, Hedeem 1972, Hirai and Matsui 1999, Santos et al. 2004).

Movement may also elicit ingestion of non-prey material. Frogs and toads have been found to ingest fishing lures (Stebbins and Cohen 1995), stones (Engelbert et al. 2008), and plant matter, such as seeds or flowers, if perceived as prey (Hamilton 1948, Oliver 1955, Stebbins and Cohen 1995). In most cases, it is unclear if ingestion of plant material is deliberate (but

see Silva et al. 1989), but selecting for vegetation in the diet may provide anurans benefit (Anderson et al. 1999). Therefore, fruit-eating may prove to be a possible method of seed dispersal (Silva et al. 1989, Fialho 1990).

Herein, we present an observation of frugivory (i.e., fruit-eating) by a green treefrog (*Hyla cinerea*) from northeastern Arkansas. This report describes this incident and is intended to encourage further studies of amphibians ingesting plant material and potentially acting as seed dispersers.

Materials and Methods

An adult green treefrog was collected in Jonesboro, Craighead County, Arkansas, during mid-September 2014. The frog was euthanized in a dilute chlorobutanol solution before being measured and examined. A hard mass was noticed during the examination and dissection was initiated. The stomach was visibly full and was removed. The frog was fixed in 10% neutral buffered formalin for 48 hours before being transferred to 70% v/v ethanol and deposited into the ASU Herpetological Museum. The contents of the stomach were removed and placed into a vial. Both the stomach and contents were fixed in 10% neutral buffered formalin for 48 hours before being transferred to 70% v/v ethanol. Stomach contents were photographed and identified to lowest achievable taxonomic level.

Results

Stomach contents included the elytra of a spotted cucumber beetle (*Diabrotica undecimpuncta howardi* Barber [Coleoptera: Chrysomelidae]) and two fruits identified as *Persicaria* sp. (likely *P. punctata* (Elliot) Small; Polygonaceae), commonly known as dotted knotweed, and *Oryza sativa* L. (Poaceae), commonly known as Asian rice. The treefrog measured 27 mm snout-vent length (Figure 1A), and its emptied stomach measured 10 mm long by 4 mm wide (Figure 1B-C).

Frugivory in a Green Treefrog

The fruit of the Asian rice measured 8 mm long by 3 mm wide (Figure 1D), and the *Persicaria* fruit measured 3 mm long by 2 mm wide (Figure 1E-F).



Figure 1: Photographs of treefrog (A), stomach contents (B width and C length), *Oryza sativa* L. fruit (D), and *Persicaria* sp. fruit (E with persistent perianth and F with perianth peeled away from achene). Arrows point to beetle elytra (B), *O. sativa* L. fruit (g) and treefrog stomach (s), and the perianth (E) and achene fruit (F) of *Persicaria* sp. Ruler lines denote millimeters.

Discussion

Although this is a solitary case of frugivory, further studies may determine if fruit-eating is accidental or deliberate and how prevalent it is in treefrogs. The presence of two fruits of different plants, however, may indicate potential cases of frugivory are fairly common. The size of the *O. sativa* L. fruit is also of interest. The relaxed stomach measured only two mm longer and one mm wider than the fruit. We believe that the frog may not have been able to pass this fruit naturally, which could result in a forcible expulsion through regurgitation, or impaction, which could lead to death. The *Persicaria* sp. fruit, however, was small enough to be easily passed.

Interestingly, both fruits appeared to be undigested, while the only remnants of the beetle were the elytra. If the stomach acid does not damage the fruit, and it is passed or regurgitated, it may germinate, as seen by Fialho (1990) in *Xenohyla truncata*. If fruits eaten by treefrogs can germinate, then the treefrogs may act as a dispersal agent for the plant species.

Acknowledgments

Authorization of treefrog collection was granted by a collection permit from the Arkansas Game and Fish Commission. We would like to thank Johnny Konvalina for specimen collection. We also thank Dr. Gregory Phillips for use of his photomicroscope. The treefrog was deposited in the Arkansas State University Herpetological collection under ASUMZ 33290.

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