First record of Anura (*Dendropsophus columbianus* -Anura: Hylidae-) as floral visitors of Araceae (*Zantedeschia aethiopica* (L.) Spreng)

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ABSTRACT

No amphibian has yet been reported among the many interactions between Araceae and their flower visitors. This paper reports the possible use of the inflorescences of *Zantedeschia aethiopica* as a habitat for *Dendropsophus columbianus*, and suggests that further exploration of this kind of interaction would be of interest.

KEY WORDS

Araceae, Amphibian, habitat use, plant-animal interaction.

INTRODUCTION

The interactions Araceae – vertebrates are mainly documented for herbivorous mammals (Altricher et al., 2000; Hibert et al., 2013) or frugivorous animals such as bats, primates, marsupials or birds (Santori et al., 1995; Thoisy & Richard-Hansen 1997; Vieira & Izar, 1999; Galetti et al., 2000;
Cockle, 2001). It appears that vertebrates are not associated with the pollination of Araceae and in fact the pollinators and floral visitors of Araceae are almost exclusively invertebrates (Gibernau, 2011; Chartier et al., 2014), although there is one known case of vertebrates visiting and probably pollinating an aroid; Anthurium sanguineum by hummingbirds (Kraemer & Schmitt, 1999).

Among the vertebrates, anurans are not particularly associated with Araceae, but in Brazil, the only known case studied, the frugivorous frog (Xenohyla truncata) eats berries of Anthurium harrisii, and they form the main source of fruits for this frog during its fruiting season from August to December (Da Silva et al., 1989; Da Silva & de Britto-Pereira, 2006; Galindo-Uribe & Hoyos-Hoyos, 2007). These fruits represent an important complement to the insect diet collected in water tanks and could represent a source for particular defensive toxins such as saponins and calcium oxalate crystals in the case of Anthurium (Da Silva & Britto-Pereira, 2006). Many Aroid species are known to be used as leafhangers by various species of anurans and thus be part of their habitat (Rojas-Morales et al., 2011; Escobar-Lasso & Rojas-Morales, 2012).

Zantedeschia is a genus distributed mainly in South Africa, but introduced in the Neotropics and well adapted to the new environments. They grow close to water bodies. In its natural habitat, its main floral visitors and pollinators are beetles of the families Scarabaeidae and Scydmaenidae (Letty, 1973; Singh et al., 1996; Mayo et al., 1997; Gibernau, 2011), but no observations have been published so far in the introduction zones. In Zantedeschia, the spathe is usually persistent, and closed at the bottom with the top of wide open making an obconic subcylindric tube, (Mayo et al., 1997). So the inflorescence represents a wide cone large enough for a copulation site or shelter of certain anurans similar to what can be found in bromeliads. Here we present the first record of an Amphibian as a floral visitor of Zantedeschia aethiopica, in the Department of Risaralda, Colombia.

Detail of the record

Observations were done during November 24th and December 3rd of 2013, at the Hacienda Lisbran located on the western flank of the Colombian Central Cordillera in the Department of Risaralda, between 1750 to 2250 masl, at the Swiss village of La Florida, municipality of Pereira (4°44’20” N 75°35’23” W). The average annual temperature is 16.8°C with an average annual rainfall of 2638.5 mm (MAVD, 2010). The habitat in the living area is a lower montane wet forest bmh-MB (Holdridge, 1971). Three sightings were recorded of Dendropsophus colombianus a terrestrial frog, endemic to Colombia (Ruiz-Carranza et al., 1996), visiting inflorescences of Zantedeschia aethiopica. Individuals of Z. aethiopica were located within 5 m of a water body.

The first sighting was on November 25th 2013 at 23:20 h. A male individual was
Figures 1-2. The first sighting. -1. A male of *D. Colombianus* within the inflorescence of *Z. aethiopica*. Inside the white circle, at the bottom of the floor is a female possibly conspecific. -2. Detail of the male frog inside the inflorescence.
vocalizing at a height of 114.3 cm, and nearby on the basal leaves of the same plant, a female individual was observed that could be by its size a female of *D. colombianus* (Figures 1, 2). The second observation took place on November 31st 2013 at 20:00 h, the same individual of *D. colombianus* was found vocalizing and perched on the same spathe of *Z. aethiopica*. The third sighting was on December 1st 2013 at 23:40 h, the individual of *D. colombianus* was on the outside of a young maturing infructescence. This individual was observed to leave the inflorescence and later to slide down along the peduncle (Figures 3–6).

We present here the first record of an anuran making more than one visit to inflorescences of an Araceae. Our observations appear to indicate that the frog *D. colombianus* uses the inflorescence of *Z. aethiopica* as a resource location for vocalization, copulation and maybe feeding. This terrestrial frog has found in the inflorescence of *Z. aethiopica* a limited space in which to shelter but also easy to access from the ground and which offers an elevated singing site. It is an advantage for the males of *D. colombianus* to sing from some height since their calls can be heard from a longer distance (Wells & Schwartz, 1982). Spending long periods of time within the inflorescence, the frogs might influence the night reproduction of *Z. aethiopica* positively by achieving potential pollination or negatively by feeding on visiting insects. It's not known if the frogs stay within the inflorescence during the day and could affect reproduction during the day. The inflorescences occupied by frogs were pollinated, as indicated by the swelling of the base of spadix (ovaries) and the surrounding spathe and by wilting of the upper parts (male flowers, flagging of the spathe), which in Araceae is indicative of flower fertilization (García-Robledo et al., 2005).

We think that since *Zantedeschia aethiopica* is an introduced species in the Neotropics, it may well be displacing other native aroids, but may now allow other types of interaction with animals (Amphibious) that were not possible in many native aroids due to the shape of the inflorescence. We recognize that this represents a small number of observations, but they were consistent enough to suggest that further field work is needed to study the frequency and the outcomes of this new and original interaction between *D. colombianus* and *Z. aethiopica* in Colombia. Even more important would be to find a similar interaction involving an aroid native to the area. This could then lead to investigating an evolved pathway, which could scarcely be possible when the plant component is a recent introduction like the *Zantedeschia*.

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LITERATURE


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