Analyzing the Diet and Distribution of *Aldrovanda vesiculosa* through Metabarcoding and Modeling

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Introduction

- *Aldrovanda vesiculosa*, a relative of the Venus flytrap, is a species of aquatic carnivorous plant.
- It is endangered in most of its native range (the Eastern Hemisphere). As a result, plant growers moved individuals to the United States to maintain a viable population. It is likely to become an invasive species in the United States.
- One of our goals is to understand the diet of the plant by using *Aldrovanda* samples found in Upstate New York and discuss if the plant is competing for the same food sources as native species.
- To determine the types of prey found in the samples, we use metabarcoding of the CO1 gene.
- To predict areas of possible spread, our second goal, we use mapping to estimate the potential habitat of the plant in the northeast region of the United States.

Methods

Dietary Analysis:

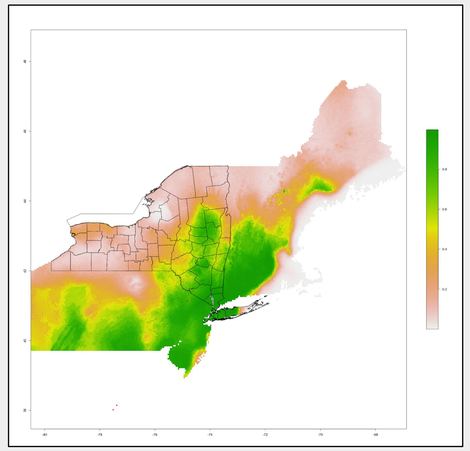
- *A. vesiculosa* samples were taken from New York
- Samples were observed under a dissection microscope
- Prey were photographed and prepped for sequencing
- We used the COI gene and metabarcoding to identify prey samples
- Sequences were BLASTed in NCBI's database

Species Distribution Modeling:

- *A. vesiculosa* location data and climatic variables for the Eastern U.S. were retrieved from GBIF and BioClim, respectively.
- Species distribution maps were created with the package ENMEval in R using this data.

Results

- Through mapping, the main regions where *A. vesiculosa* is predicted to have suitable climate is from downstate New York, western Connecticut and Massachusetts, southern and eastern Pennsylvania, and New Jersey.



- From the metabarcoding results of the 8 test samples, an amphipod*, Hyalella azteca,* was found in *Aldrovanda vesiculosa* traps. Metabarcoding also detected Trichoptera (caddisflies).
- The prey that were visually surveyed include Cladocera (water fleas)*,* Diptera *(*includes flies, mosquitoes,etc.)*,* Amphipoda (amphipods; *H. azteca* according to metabarcoding), and Trichoptera (caddisflies).

Discussion

- Metabarcoding allows us to find finer scale identification of invertebrates. However, it did not efficiently collect DNA from all samples, presumably because the assessed invertebrates were all partially digested.
- Based on our mapping, areas such as downstate New York and northern New Jersey are suitable locations for *Aldrovanda vesiculosa.*
- While our dietary analysis is a modest sample size, it still showed that *A. vesiculosa* consumes a wide variety of prey consisting of practically any arthropod that fits in its traps.
- Our results show that, based on climate, there is a large region in the northeastern United States where *A. vesiculosa* can spread and potentially outcompete native biota or endanger prey due to its varied diet.

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