



# Does climate limit arboreality in lungless salamanders?

Lauren Mellenthin<sup>1</sup>, Erica Baken<sup>1</sup>, Dr. Dean Adams<sup>1</sup>

<sup>1</sup>Iowa State University, Ames, Iowa

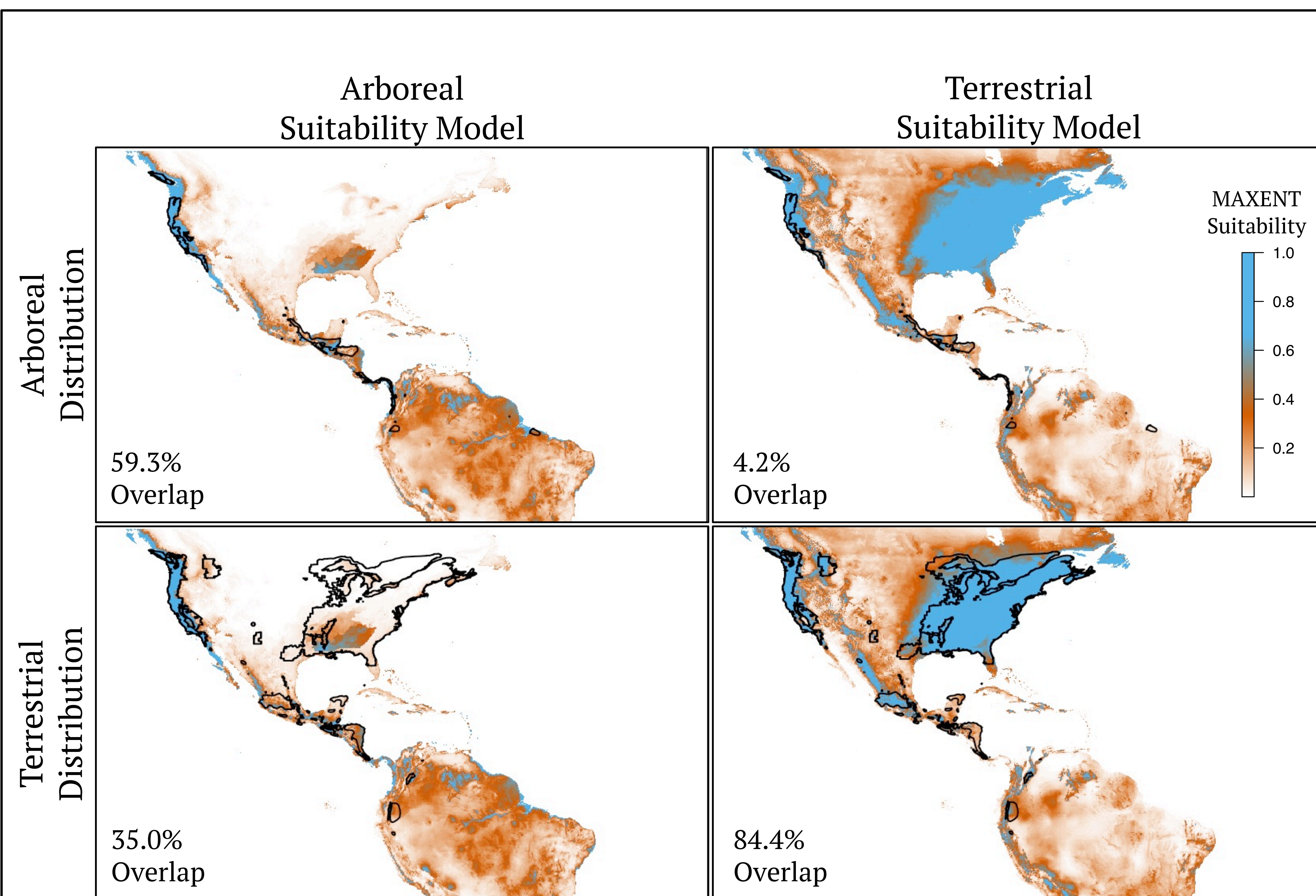
## Introduction

- Arboreality has evolved at least 5 times within Plethodontid salamanders [1]
- Yet no morphological differences separate arboreal and terrestrial species [1]
- There is little range overlap between the two microhabitat types. Preliminary results discovered that 71% of the arboreal species distribution does not overlap with the terrestrial species distribution.

From these observations we tested the following hypotheses:

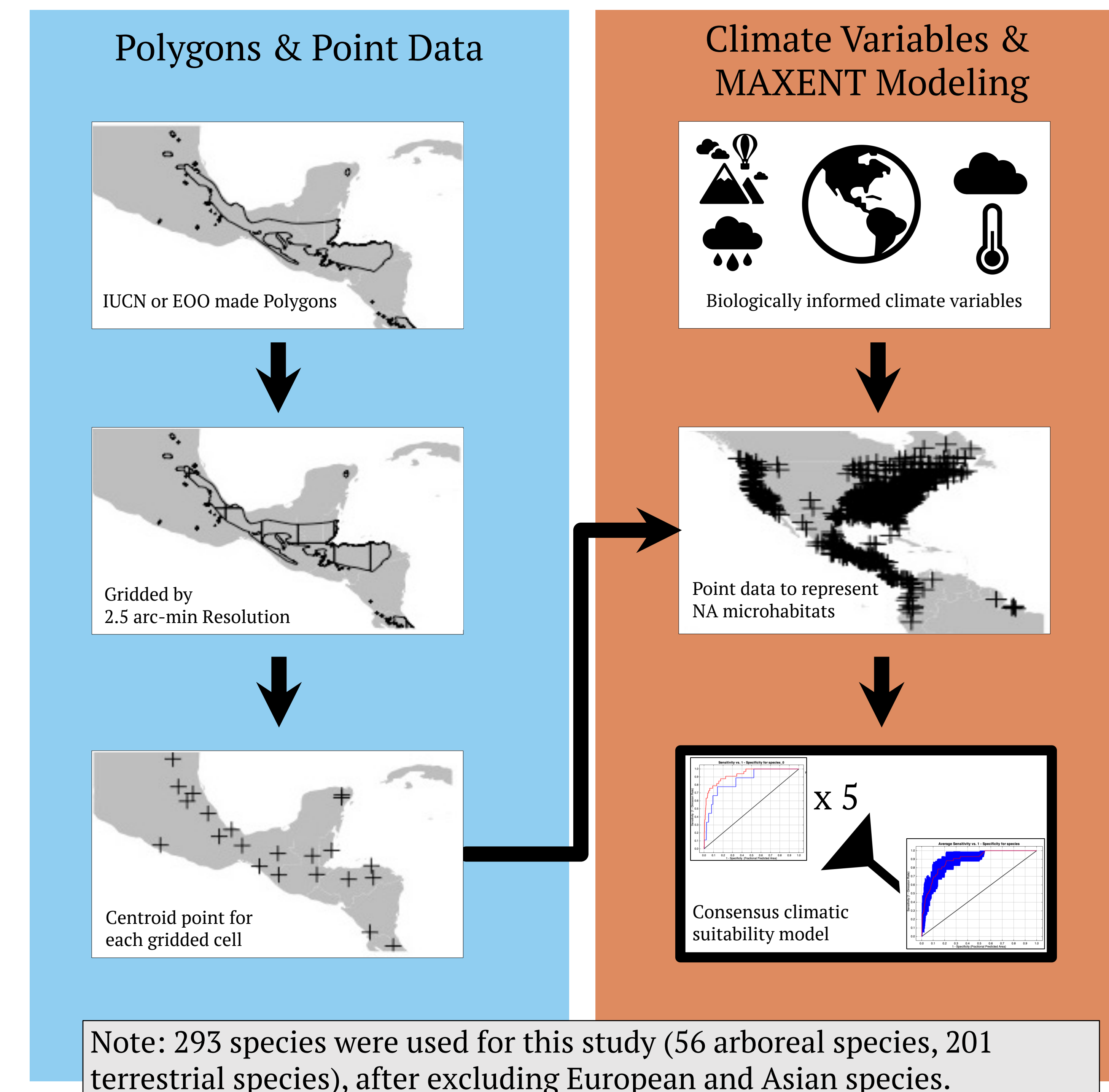
(*H1*) Terrestrial species do not live in habitats suitable for arboreality

(*H2*) Arboreal species do not live in habitats suitable for terrestrial life



**Figure 1.** We used environmental niche models (ENM) to evaluate the overlap in species distributions and their corresponding niche models. Blue coloration representing 0.5 suitability, red coloration representing 0.25-0.49 suitability, and white coloration representing 0-0.24 suitability. Models averaged over 5 all with AUC above 0.85.

## Materials & Methods



## Conclusions

Despite the broad scale of these climate data, we found:

(*H1*) Little of the terrestrial species distribution is suitable for arboreality (35%)

(*H2*) Even less of the arboreal species distribution is suitable for terrestrial life (4%)

## Future Directions

- These results suggest climate may have influenced the macroevolution of arboreality in this family. Further research is needed to elucidate this pattern.
- Understanding the climactic limits of different species can inform future climate projection models [2]

## Acknowledgments & Literature Cited

Thanks to the following: NSF for funding. Comments & feedback from Dr. Dean Adams' evolutionary morphology lab, specifically Bryan Juarez and Elizabeth Glynn. IUCN for open access data. R statistical software & packages of dismo, rgdal, and rgeos.

1. Baken and Adams. Accepted. Macroevolutionary of Arboreality in Salamanders. Ecology and Evolution.
2. McEntire, Kd. "Plant Climbing by Salamanders as a Compensatory Behavior in Relation to Climate." *Integrative and Comparative Biology*. 59 (2019)
3. Salamander silhouettes: Phylopic, Matt Reinbold (modified by T. Michael Keeseey), Licence link: <http://creativecommons.org/licenses/by-sa/3.0/>
4. Bonett, R. M., and A. L. Blair. 2017. Evidence for complex life cycle constraints on salamander body form diversification. *Proc. Natl. Acad. Sci.* 114(37):9936-9941.

