February 12, 2023

Dear Professor Alistair M. Hetherington,

Editor-in-Chief *New Phytologist:*

We are excited to submit our revised manuscript now entitled “*The evolutionary responses of life-history strategies to climatic variability in flowering plants*” for your consideration to be included in Global Plant Diversity and Distribution special issue of New Phytologist and Plants, People, Planet. We have considered all the comments presented to us by the associate editor and four reviews and incorporated many of their suggestions to improve this work. In particular, a major concern shared amongst most of the reviewers was a lack of clarity in describing some of the modeling procedures and a request to add additional details of the specific biological consequences of our findings. In response, we have greatly improved the clarity of the manuscript as well as added additional clade-specific details as to the significance of our results.

1. What hypotheses or questions does this work address?

We evaluate two hypotheses: (1) annuals tend to evolve in highly seasonal regions prone to extreme heat and drought, because they can take advantage of short beneficial climatic conditions for reproduction, and (2) annuals tend to have faster rates of climatic niche evolution due to their higher vagility and shorter generation times.

2. How does this work advance our current understanding of plant science?

How hot it gets during the warmest season of a year, is the main climatic factor influencing the evolution of annual life history strategy. Annuals are favored in this type of climate due to their ability to escape heat stress as seeds but are outcompeted by perennials in regions where extreme heat is uncommon or inexistent.

3. Why is this work important and timely?

Previously documented correlations between life history strategy and climate appear to be clade-specific and fail to consider the coevolution of climatic niches and life history strategies. Here we combine life history data with geographic distribution for 9,939 species and utilize a newly developed method that accounts for the joint evolution of continuous and discrete traits.

Thank you very much for your consideration, and we look forward to hearing from you.

James D. Boyko

Eric R. Hagen

Jeremy M. Beaulieu   
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