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Does Diet Breadth Resolve Variation in Climate Driven Range Shifts of Ohio Butterflies?

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Introduction

- Many species are shifting from their geographic ranges due to climate change[1, 2, 3].
- These range shifts responses tend to be poleward or upslope, but variation exists in both the magnitude and direction of range shift responses[1].
- Theory suggests that specialization may constrain range shifts[2].
- Here, we hypothesize range shift responses will depend on the degree of specialization in host plant usage (diet breadth).

Methods

- We examined 85 native Ohio butterflies.
- Latitudinal range shifts were calculated using long-term community science monitoring data from the Ohio Lepidopterists.
- Diet breath was based on published records of suitable host plants[4].
- We defined diet specialization as the number of host plant species or genera used by each butterfly.
- We examined the relationship between range shift and diet breadth, both as a simple correlation and using phylogentically informed generalized linear models.

Results

How are ranges of Ohio butterflies shifting?

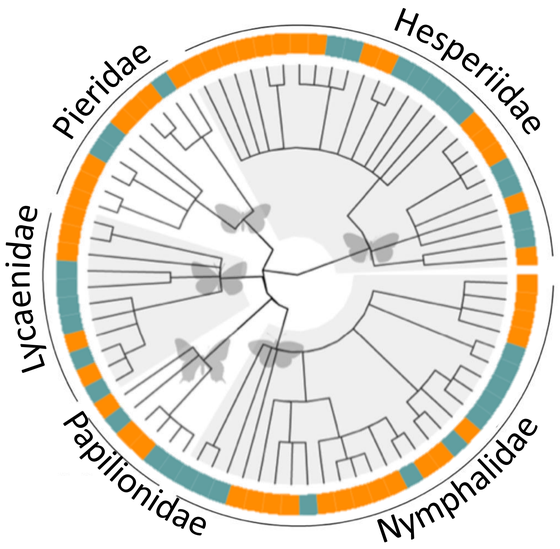

Figure 1: Phylogeny of the 85 butterfly species colored by the direction of geographic range shift.

Does diet breadth resolve range shift variation?

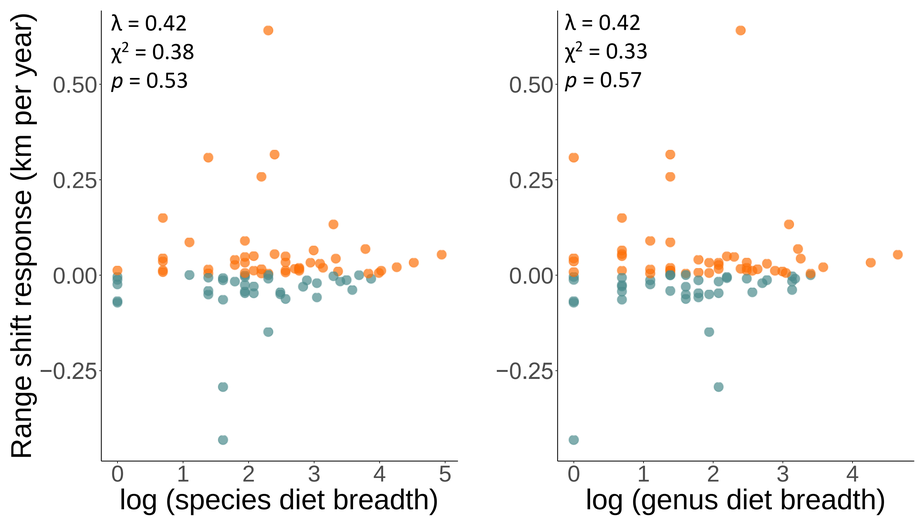

Figure 2: Butterfly range shifts predicted by species diet breadth at the level of plant species (left) and plant genus (right).

Conclusions

- We found variation in butterfly range shift responses in Ohio, but diet specialization did not resolve this variation.
- The effect of diet breadth did not depend on if we counted host plants by species or by genus.
- Phylogenetic signal was moderate (0.42) suggesting this relationship is structured by the butterfly phylogeny.
- In future work, other areas of specialization might reveal an association with range shift responses.

Acknowledgments

Literature cited
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