

THE UNIVERSITY OF BRITISH COLUMBIA



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Dear Dr. Simon Levin,

We are excited to submit our manuscript entitled “Intraspecific genetic variation increases network complexity: empirical evidence from a plant-insect food web” for consideration to be published in Proceedings of the National Academy of Sciences.

In this manuscript, we provide new insight as to how genetic variation within key species scales up to determine the structure of ecological networks. Specifically, we test the theoretical prediction that intraspecific genetic variation leads to increased network complexity, which before now remains untested. Using a large common garden experiment, we illustrate how heritable trait variation in a host plant directly and indirectly determines the assembly of its associated insect food web (network of trophic interactions). We found that different host-plant genotypes supported unique compositions of trophic interactions. Moreover, we found that this genetic specificity in trophic interactions resulted in a 50% increase in food-web complexity over the range of genetic variation in the host-plant population. Taken together, our study suggests that intraspecific genetic variation likely plays an underappreciated role in shaping the structure and dynamics of ecological networks.

We feel that this manuscript provides a novel and general contribution to science for several reasons. Our study is one of the first to empirically demonstrate the cascading effects of intraspecific genetic variation on food-web structure. In doing so, our study provides clear directives for future research on how ecological and evolutionary processes interact to shape food webs. Finally, our work is multidisciplinary, integrating research on diverse topics such as network theory, ecological genetics, and food webs, and should be of interest to the broad readership of Proceedings of the National Academy of Sciences.

We think that Dr. Daniel Simberloff would be an appropriate NAS member editor for this submission and suitable reviewers for this manuscript include: Dr. Anurag Agrawal (Cornell University), Dr. Daniel Bolnick (University of Texas), Dr. Jordi Moya-Laraño (EEZA-CSIC), Dr. Priyanga Amarasekare (UCLA), Dr. Kevin McCann (University of Guelph), and Dr. Kailen Mooney (UC Irvine).

Thank you for your assistance with this manuscript. I look forward to hearing from you regarding the reviews.

Sincerely and on behalf of my co-authors,

Matthew Barbour

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List of Editorial Board Members – I’ve included a short description of research for those board members that I’m familiar with and think may be appropriate.

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Given the length of the member editor list, I decided to include a short list of potential editors whose research I’m familiar with and that overlap with this manuscript. Although I’m sure you are familiar with most, if not all, of these people, I just included a short description of their expertise for clarity.

Short list of PNAS member editors for Environmental Sciences and Ecology:

- Stephen R. Carpenter – food webs
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- James Estes – food webs
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- Daniel Simberloff – community ecology

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- Thomas W. Schoener – eco-evolutionary dynamics

Short list of potential reviewers:

- Dr. Anurag Agrawal (Cornell University) – evolutionary ecology of plant-insect interactions (primarily herbivory)
- Dr. Daniel Bolnick (University of Texas) – consequences of intraspecific variation for ecological communities.
- Dr. Jordi Moya-Laraño (EEZA-CSIC) – evolutionary ecology of food webs
- Dr. Priyanga Amarasekare (UCLA) – evolutionary ecology of host-parasitoid interactions
- Dr. Kevin McCann (University of Guelph) – food webs
- Dr. Kailen Mooney (UC Irvine) – evolutionary ecology of plant-insect interactions (primarily tri-trophic)
- Dr. Carlos Melian (EAWAG) – evolutionary ecology of food webs