

# THE UNIVERSITY OF BRITISH COLUMBIA



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Dear Dr. Simon Levin,

We are submitting a 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.

For the past 15 years, network theory has provided new insight as to how the organization of species interactions can shape the dynamics of diverse ecological communities. Simultaneously, ecologists have been revealing how genetic and phenotypic variation within key species can influence the assembly of ecological communities. While theory suggests that intraspecific genetic variation can increase the complexity of ecological networks, there have been few empirical tests of this prediction. In this study, we used a large common garden experiment to examine how heritable trait variation in a host plant directly and indirectly determines the assembly of an insect food web (network of trophic interactions). We found that these direct and indirect effects resulted in unique compositions of trophic interactions associated with each host plant genotype. 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 experimental population of host plants. 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. In particular, our study is one of the first to empirically demonstrate how intraspecific genetic variation scales up to determine the structure of species interaction networks. In doing so, our study provides clear directives for future empirical and theoretical research on the interplay between ecological and evolutionary processes in shaping network structure. Finally, our work is multidisciplinary, integrating research on diverse topics such as network theory, ecological genetics, and food webs, and therefore 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 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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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:

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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