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Dear Editor,

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 structure of species interactions networks can shape the dynamics of diverse ecological communities. Simultaneously, ecologists have been revealing how genetic and phenotypic variation within dominant 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 illustrate how heritable trait variation in a host plant directly and indirectly shapes the assembly of an insect food web (network of trophic interactions), resulting in unique compositions of trophic interactions associated with each host plant genotype. Moreover, we demonstrate how 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 identify the extent to which intraspecific genetic variation can influence the structure of an ecological network. In doing so, our study provides clear directives for future empirical and theoretical research on how ecological and evolutionary processes shape the structure and dynamics of species interaction networks. 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.

Given that our study lies at the interface of ecology and evolution, we think that either Dr. Daniel Simberloff or Dr. Douglas Futuyma would be an appropriate 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. Jonathan Levine (ETH Zürich), 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