

Ana Miller-ter Kuile
E-mail: ana.miller-ter.kuile@lifesci.ucsb.edu

May __, 2021

To the editors of *Ecology*:

Enclosed, please find a manuscript my co-authors and I believe would be ideally suited for *Ecology*. In this article, entitled, “Predator-prey interactions of terrestrial invertebrates are determined by predator body size and species identity”, we present results of a study examining how predator body size and species identity shape predator-prey interactions in invertebrate communities. This study is directly in the scope of *Ecology*, by using a novel method (diet DNA metabarcoding) to provide empirical data that tests and illuminates an accepted method of inferring predator-prey interactions: assigning interactions based on both predator and prey body size. In it we link interaction outcomes to predator identity in a model system, with broader implications for validating terrestrial invertebrate food webs globally.

Our findings suggest that both predator body size and predator identity (and the ecological roles those identities indicate) predict the body size of their prey species. Interestingly, while predators (spiders, insects, and centipedes) use varied hunting strategies such as venom and webs, we did not find consistent benefits of these strategies in increasing the size of their prey. Rather, relationships between predators and prey were driven by predator species identity, not grouped by hunting strategy. By using diet DNA metabarcoding data, our study provides novel interaction data for a set of organisms which we have limited observed knowledge. This study comes at a key time, as recent synthetic work in this field (see Brose et al. 2019 *Nature Ecology & Evolution*) aims to build predictions using similar datasets. However, this synthesis (following historical methods in food web ecology) relies on data for which a small minority (~2 – 13%) of interactions among invertebrate taxa are empirically observed (visualized in our SI Figure 12). Our study comes at an ideal time to provide not only empirical validation for, but also critical identity-specific exceptions of, a key ecological theory (predator-prey size scaling).

The work in this manuscript is all original research carried out by the authors and all authors agree to its content. We have no conflicts of interest to report and have received appropriate research approvals. The results in this manuscript have not been submitted for publication elsewhere, nor are they previously published. We look forward to hearing your thoughts on this work. On behalf of my co-authors, I thank you for your consideration of our submission, and we look forward to hearing your response.

Sincerely,

Ana Miller-ter Kuile
Department of Ecology, Evolution and Marine Biology | UC Santa Barbara