

Relative importance of top-down and bottom-up forces in food webs of *Sarracenia* pitcher communities at a northern and a southern site

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Abstract The relative importance of resources (bottom-up forces) and natural enemies (top-down forces) for regulating food web dynamics has been debated, and both forces have been found to be critical for determining food web structure. How the relative importance of top-down and bottom-up forces varies between sites with different abiotic conditions is not well understood. Using the pitcher plant inquiline community as a model system, I examine how the relative importance of top-down and bottom-up effects differs between two disparate sites. Resources (ant carcasses) and top predators (mosquito larvae) were manipulated in two identical 4×4 factorial press experiments, conducted at two geographically distant sites (Michigan and Florida) within the range of the purple pitcher plant, *Sarracenia purpurea*, and the aquatic community that resides in its leaves. Overall, top predators reduced the density of prey populations while additional resources bolstered them, and the relative importance of top-down and bottom-up forces varied between sites and for different trophic levels. Specifically, top-down effects on protozoa were stronger in Florida than in Michigan, while the opposite pattern was found for rotifers. These findings experimentally demonstrate that the strength of predator–prey interactions, even those involving the same species, vary across

space. While only two sites are compared in this study, I hypothesize that site differences in temperature, which influences metabolic rate, may be responsible for variation in consumer–resource interactions. These findings warrant further investigation into the specific factors that modify the relative importance of top-down and bottom-up effects.

Keywords Predator–prey interactions · Top-down effects · Spatial ecology · Food web dynamics · *Sarracenia purpurea*

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