

Turning up the heat: Temperature influences the relative importance of top-down and bottom-up effects

DAVID HOEKMAN¹

Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana 46556 USA

Abstract. Understanding how communities respond to changes in temperature is a major challenge for community ecology. Temperature influences the relative degree to which top-down and bottom-up forces structure ecological communities. In greenhouse experiments using the aquatic community found in pitcher plants (*Sarracenia purpurea*), I tested how temperature affected the relative importance of top-down (mosquito predation) and bottom-up (ant carcasses) forces on protozoa and bacteria populations. While bottom-up effects did not vary consistently with temperature, the top-down effects of predators on protozoa increased at higher temperatures. These results suggest that temperature could change the relative importance of top-down and bottom-up effects in ecological communities. Specifically, higher temperature may increase the strength of top-down effects by raising predator metabolic rate and concomitant processes (e.g., activity, foraging, digestion, growth) relative to cooler temperatures. These findings apply broadly to an understanding of trophic interactions in a variable environment and are especially relevant in the context of ongoing climate change.

Key words: food web; laboratory experiment; predation; temperature; top-down vs. bottom-up forces; *Wyeomyia smithii*.