

# This Week's Citation Classic

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**Hairston N G, Smith F E & Slobodkin L B.** Community structure, population control, and competition. *Amer. Naturalist* **94**:421-5, 1960. [Department of Zoology, University of Michigan, Ann Arbor, MI]

**Photosynthetically fixed energy accumulates at a negligible rate, and direct consumption of primary production is minimal. Decomposers, producers, and carnivores must be resource-limited, and in them competition is inevitable. Herbivores are most likely to be predator-limited and not in competition. [The SCI® indicates that this paper has been cited over 195 times since 1961.]**

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"The paper began during an argument between Larry Slobodkin and me, in which Fred Smith soon joined. In the period when the density-dependence controversy was hot, the conclusion that competition is inevitable because dead organic matter is consumed and does not accumulate seemed to be worth saying. I had been led to the idea by my work on soil arthropods, and our argument led us to incorporate the other trophic levels, as we cited evidence to each other about green plants, pest outbreaks, territoriality, and the rarity of herbivores relative to their food. When we wrote the paper, we were optimistic about the future of ecology, and we were convinced that a theory encompassing the field might soon be produced. I regarded it as a very general first step towards such a theory.

"The work is a straightforward, logical development from some generally accepted observations: we aren't making much coal, and the world is green. These are sometimes misstated to be arguments. They are facts, and the arguments are over the interpretations, particularly of the second.

"We hoped that the paper would be convincing, but expected that it would be controversial, especially among ecologists advocating the importance of density-independent factors in population regulation. It has been controversial from the start, as it was rejected flatly by the editor of *Ecology*, to whom we sent it first. Few ecologists are neutral about the paper, and I am uncertain how it would fare on a vote. One of my former graduate students recently referred to it as 'infamous,'<sup>1</sup> but it received several favorable comments at a March 1981 conference on ecological communities, sponsored by Florida State University. The two best known challenges to our paper are by Murdoch<sup>2</sup> and by Ehrlich and Birch.<sup>3</sup> In our response to them, we listed our six principal conclusions, and proposed means whereby each of them could be falsified.<sup>4</sup> To my knowledge, no one has attempted to meet these challenges. I am convinced that the conclusions we reached are valid, and that different ecological forces regulate different trophic levels.

"The controversial nature of the paper surely contributed to the frequency with which it has been cited, but the simplicity, generality, and brevity made it attractive in a period when syntheses were beginning to be widely attempted in ecology. It must continue to be a challenge to some and a guide to others. We cannot claim that a five-page paper is a major source of information."

1. Gill D E. Parasites as model ecological and evolutionary organisms. *Evolution* **35**:402-4, 1981.
2. Murdoch W W. Community structure, population control, and competition—a critique. *Amer. Naturalist* **100**:219-26, 1966.
3. Ehrlich P R & Birch L C. The "balance of nature" and "population control." *Amer. Naturalist* **101**:97-107, 1967.
4. Slobodkin L B, Smith F E & Hairston N G. Regulation in terrestrial ecosystems, and the implied balance of nature. *Amer. Naturalist* **101**:109-24, 1967.