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This Week's Citation Classic®

Connell J H. Some mechanisms producing structure in natural communities: a model and evidence from field experiments. (Cody M L & Diamond J M, eds.) *Ecology and evolution of communities*. Cambridge, MA: Belknap Press, 1975. p. 460-90.
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Natural enemies (predators, herbivores, parasites, and pathogens), competitors, and the physical environment all affect the distribution and abundance of organisms in natural communities in complex and interacting ways. The best evidence for these findings comes from controlled field experiments testing hypotheses generated by observations of natural patterns. [The *SCI*® indicates that this paper has been cited in over 460 publications.]

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I wrote this paper to make a point, to challenge a prevailing scientific viewpoint that I felt was much too narrow. At the time I was writing it, current wisdom held that competition was the principal mechanism determining the structure of natural ecological communities. I had been invited to a small symposium in which most of the other participants held this view to varying degrees. I decided to take an opposing stance and to try to marshal the best evidence available concerning the *relative* importance of physical factors, natural enemies (predators, herbivores, parasites, and pathogens), and competition as ecological mechanisms.

I was also trying to make a second point: that much of the evidence that had been cited in support of the importance of competition was very weak. As tests of competition theory it was usual to examine patterns of spatial distribution, food habits, relative abundances, niche overlaps, and the like to see how they conformed to the predictions of theory. I argued that controlled field experiments, whose essential aspect is that everything varies in the same way between treatment and control except for the factor being tested,[1] yielded far superior evidence. Such field experiments need careful design, but with enough ingenuity in designing controls and sufficient replication, they are usually superior to descriptive comparisons. Although most biologists in other disciplines routinely used the experimental method, most ecologists at that time did not.

In the book that resulted from the symposium (cited above) none of the other papers cited field experimental evidence, and those that dealt with community structure continued their emphasis on competition as the principal mechanism. In contrast, I constructed some theoretical models of how competition and predation could vary and interact along gradients of physical stress and with variation in body size of predator and prey.

I suppose that this paper has been cited so frequently because many other ecologists had, like me, become fed up with the one-sided view that competition was so much more important than other influences on the distribution and abundance of organisms. My paper may have struck a responsive chord in their breasts. My ideas seemed just common sense to me, since for the past 20 years I had been studying natural communities on marine rocky shores, in rain forests, and on coral reefs, where competition, predation, and the weather all played significant roles.[2,3] When a hurricane changed the hydrology of the coral reef I was studying and completely altered the community composition, it made a believer of me.

Several of my controlled field experiments indicated that the physical environment, natural enemies, and competition could interact to determine the limit of distribution of intertidal animals. My paper synthesized the small amount of experimental evidence then available and apparently made a convincing case that community structure is the result of many interacting mechanisms, among them competition. For a recent review of this field see reference 4.

1. **Connell J H.** On the prevalence and relative importance of interspecific competition: evidence from field experiments. *Amer. Naturalist* 122:661-96, 1983. (Cited 175 times.)
2. ————. Effects of competition, predation by *Thais lapillus*, and other factors on natural populations of the barnacle *Balanus balanoides*. *Ecol. Monogr.* 31:61-104, 1961. (Cited 290 times.)
3. ————. Diversity in tropical rain forests and coral reefs. *Science* 199:1302-10, 1978. (Cited 495 times.) [See also: **Connell J H.** Citation Classic. *Current Contents/Agriculture, Biology & Environmental Sciences* 18(46):16, 16 November 1987.]
4. **Benton M J.** Progress and competition in macroevolution. *Biol. Rev. Cambridge Phil. Soc.* 62:305-38, 1987.

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