

This Week's Citation Classic

Connell J H. The influence of interspecific competition and other factors on the distribution of the barnacle *Chthamalus stellatus*. *Ecology* 42:710-23, 1961. [Dept. Biology, Univ. California, Santa Barbara, Goleta, CA]

By means of controlled experimental manipulation of populations in a natural field situation, I was able to demonstrate the mechanism of operation of interspecific competition between two species of barnacles, as well as the influence of predation on the intensity of this competition. [The SCI® indicates that this paper has been cited over 145 times since 1961.]

Joseph H. Connell
Department of Biological Sciences
University of California
Santa Barbara, CA 93106

April 27, 1981

"I should say at the outset that this work was made possible by my Scottish landlady, Mrs. Plant, whose generous terms for board and room enabled me to stretch my remaining one year of the C.I. Bill to three years (and whose wonderful soup helped ward off the Scottish weather).

"Most scientists regard the experimental method as the normal way to do empirical research. But many ecologists still don't do experiments, possibly because they associate them with white coats and indoor laboratories. I did too until I was led by Ed Deevey's review¹ to a paper² by a little-known French ecologist, Harry Hatton, who in the 1930s performed a beautiful series of experiments on natural populations of marine animals and plants. I was just finishing a frustrating field study on rabbits in the Berkeley hills, where in two years I had managed to trap only 40 rabbits, many of whom I never saw again (though one came back 19 times). I vowed then to adopt a simple rule of thumb, namely, never again to study anything bigger than my thumb, and to emulate Hatton, if I could.

"So when I began doing a PhD at Glasgow University, I decided to study the effects of predation and intraspecific competition on

barnacles by experimentally manipulating the numbers of the predators and the densities of the barnacles. My major professor, CM. Yonge, suggested that I had better not spread my study any wider. But I had been introduced to some other ideas in a field course at Oxford by Charles Elton, particularly that interspecific competition was important. So without telling my major professor, who was safely out of sight up in Glasgow while I was on the Isle of Cumbrae, I started a secret side project on interspecific competition. Again I did controlled field experiments, measuring survival and growth of one species with its competitor removed or left in place.

"This side project resulted in the paper that is the subject of the citations, while the thesis came out as another, bigger (and in many ways better) paper.³ Why did the former become cited so much? The main reason, I think, is that although interspecific competition was the mechanism being emphasized by ecological theorists at the time, there was little direct evidence of it for animals in nature. Since I had used experimental methods on a natural animal population, this was a more convincing and direct demonstration of competition than the indirect correlative methods usually used by ecologists. (Plant ecologists had for many years been doing field experiments that demonstrated competition, but the theorists apparently thought mainly about animals.)⁴

"I think that its main contribution is to demonstrate the value of the experimental method applied to natural outdoor animal populations. My thesis paper³ did this as well or better, but it dealt mostly with predation, which had until recently been thought less important than competition by many ecological theorists (although most field ecologists didn't think so). Since then this bias has been redressed, with theory becoming more in touch with reality. Anyhow, here is my message for students: follow your professor's advice and focus your research narrowly enough to make a good job of your thesis. But if you do stray from the straight and narrow into a little side project, be sure the subject is going to be scientifically fashionable."

1. Deevey E S. Life tables for natural populations of animals. *Quart. Rev. Biol.* 22:283-314, 1947.
2. Hatton H. Essais de bionomie explicative sur quelques especes intercotidales d'algues et d'animaux. *Ann. Inst. Oceanogr. Monaco* 17:241-348, 1938.
3. Connell J H. Effects of competition, predation by *Thais lapillus*, and other factors on natural populations of the barnacle *Balanus balanoides*. *Ecol. Monogr.* 31:61-104, 1961.
4. 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: Harvard University Press, 1975. p. 460-90.