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Pyke G H, Pulliam H R & Charnov E L. Optimal foraging: a selective review of theory and tests. *Quart. Rev. Biol.* 52:137-54, 1977.

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For about 17 years a number of authors have sought to predict the foraging behavior of animals by means of mathematical models, which assume that natural selection has resulted in animals that forage so as to maximize their foraging efficiency. The theory that embodies these models has consequently become known as 'optimal foraging theory.' This paper reviews the development and tests of this theory. [The SCI® indicates that this paper has been cited in over 425 publications since 1977.]

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"My involvement in optimal foraging theory (OFT) began in February 1972, during a tropical ecology course in Costa Rica run by the Organization for Tropical Studies. At that time, it occurred to me that little had been written as to why animals forage in the ways they do and that animals might be expected to have evolved efficient ways of foraging. At this time, I had also been a PhD student at the University of Chicago for just over a year and, though I cannot recall how and when it occurred, I assume that my interest in and approach to foraging was derived, in part at least, from the courses I had previously taken at Chicago. These courses emphasized the viewing of animal and plant traits as adaptations, encouraged a theoretical approach to ecology, and brought to my attention a number of papers by Robert H. MacArthur, who was the senior author of one of the earliest papers in the area of OFT.<sup>1</sup>

"The present paper resulted from several factors. I had discussed OFT with Ron Pulliam and Ric Charnov, my coauthors, on many occasions; the time seemed right for someone to review the growing subject; and teaching about OFT to students at the University of Utah helped me to sharpen my thoughts about the subject. The paper was begun in August 1975, during one of my frequent visits to Pulliam at the University of Arizona. Upon my return to the University of Utah, where I was then a faculty member of one year's standing, the contributions of Charnov were added.

"There are several probable reasons why our paper has been cited often. First, it was published at a time when relatively few papers on OFT had been published and when publications on this subject were increasing exponentially. The yearly number of publications in this area appears to still be increasing but at a much slower rate than before. Second, our paper was the first comprehensive review that categorized past research and dealt with both the development of theory and tests of resulting predictions. Schoener<sup>2</sup> had earlier reviewed theoretical approaches to foraging but at that stage there were few relevant data to review. Krebs<sup>3</sup> also reviewed foraging theory and the very limited data then available for testing the theory. Third, our paper took a proselytizing stance, presenting OFT as a most promising approach to understanding foraging behavior. Because of this, our paper may have added fuel to the growing interest in OFT. Finally, our paper provides a convenient citation for authors who wish to indicate the relevance of their work to theories of foraging.

"OFT has been a controversial subject and since we published our paper a number of attitudes toward it have developed. However, in my opinion, it is still premature to judge the usefulness of this theoretical approach and further development and tests of optimal foraging models are warranted.

"OFT has also been reviewed by Krebs<sup>4</sup> and myself."<sup>5</sup>

1. MacArthur R H & Pianka E R. On optimal use of a patchy environment. *Amer. Naturalist* 100:603-9, 1966. (Cited 390 times.)
2. Schoener T W. Theory of feeding strategies. *Annu. Rev. Ecol. Syst.* 2:369-404, 1971. (Cited 570 times.)
3. Krebs J R. Behavioral aspects of predation. (Bateson P P G & Klopfer P H, eds.) *Perspectives in ethology*. New York: Plenum, 1973. p. 73-111. (Cited 90 times.)
4. .... Optimal foraging: decision rules for predators. (Krebs J R & Davies N B, eds.) *Behavioral ecology*. Oxford: Blackwell Scientific Publications, 1978. p. 23-63.
5. Pyke G H. Animal movements: an optimal foraging approach. (Swingland J R & Greenwood P J, eds.) *The ecology of animal movement*. Oxford: Oxford University Press, 1983. p. 7-31.