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This Week's Citation Classic®

Murdoch W W & Oaten A. Predation and population stability.
Advan. Ecol. Res. 9:1-131, 1975.
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Predators are capable of driving their prey extinct or making them unstable. Various mechanisms that might nevertheless stabilize the predator-prey interaction are investigated in models, and experimental evidence is examined to determine the conditions under which a number of these mechanisms can occur in the field. [The *SCI*® indicates that this paper has been cited in over 290 publications.]

Predation and Stability of Populations

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This paper had joint origins with an earlier *Citation Classic*[1] (for which I confess I did not write a commentary). The earlier paper introduced and examined experimentally the idea that predators might stabilize populations of their prey by "switching," that is, preferentially attacking prey species that are more abundant. The research began because, as a young assistant professor at the University of California at Santa Barbara, I spent much effort surviving the intellectually bloody skirmishes engendered by a couple of ferocious graduate students widely notorious for taking no prisoners in theoretical combat. I had foolishly opined that some seashore snails no doubt switched. This led to much shouting and eventually my marching off to do a brief experiment to show the correctness of my cause. Unfortunately, snails eat slowly, behavioral experiments took many weeks, and the first monographic study lasted three years. From this I learned never to work on the feeding of an organism that eats more slowly than I do.

That study addicted me for years to come to research on predation. In the next few years, I worked on various predators: ladybug beetles, which proved too dumb to switch; bluegill fish; and back-swimming bugs. I looked at different components of predation and worked on a number of different mathematical models of both predator behavior and the dynamics of predator-prey populations, the last in collaboration with my mathematician colleague Allan Oaten.

By around 1970, therefore, I was filled to overflowing with things to say and report about predation, including knowing the literature for the last time in my career. The present *Citation Classic* resulted, and at 130 pages it is almost a book. The features that made it so easy to write are no doubt those that make it frequently cited. It presented a lot of experimental data from different types of animals, covered a great variety of aspects of predation, and included many different types of models (where Oaten contributed in a major way). It also provided one of the very few syntheses then available. I think, too, that part of its attractiveness is that at its core was the behavior of individual predators. Actual studies of populations are very hard to do, whereas one can study switching in individual predators, for example, and still be discovering something useful about population dynamics. And, of course, such behavior has implications for optimal and adaptive foraging, a subject that took off in the 1970s and is still a major area of research.[2] I am also surprised, in revisiting it now (I wonder does anyone ever reread their own papers?), to discover how many seeds of ideas in the paper flowered later. For example, a recent paper on spatial aggregation by predators[3] was adumbrated in some detail.

The paper has a 1975 date, but in fact it was completed and accepted in mid-1972. A strike of Irish printers played a central role in delaying publication for a couple of years, so that the paper appeared long after it had been referred to in the literature. Being a North Briton, I do of course wonder if that might have been an anti-Scottish plot.

1. **Murdoch W W.** Switching in general predators: experiments on predator specificity and the stability of prey populations. *Ecol. Monogr.* 39:335-41, 1969. (Cited 290 times.)
2. **Stephens D W & Krebs J R.** *Foraging theory*. Princeton, NJ: Princeton University Press, 1986. 246 p. (Cited 50 times.)
3. **Murdoch W W & Stewart-Oaten A.** Aggregation by parasitoids and predators: effects on equilibrium and stability. *Amer. Naturalist* 134:288-310, 1989.

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