

This Week's Citation Classic™

Pollard T D & Welhing R R. Actin and myosin and cell movement.

CRC Crit. Rev. Biochem. 2:1-65, 1974.

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This is a review of the early biochemical and structural studies that established the existence of the contractile proteins, actin and myosin, in nonmuscle cells. This work provided the evidence for the generally accepted concept that contractile proteins generate the forces for many types of cellular movements. [The *SCI*[®] indicates that this paper has been cited in over 945 publications since 1974.]

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"This article has been cited frequently because it was a timely, comprehensive review of a major new field in cell biology that was just on the threshold of its most rapid phase of growth. The subject is the molecular basis of cellular motility.

"Biologists have always been fascinated with cellular movements. By the late 1960s, microtubules and the ATPase protein dynein were identified as the motion generating system of eukaryotic flagella, but nothing concrete was known about the molecular basis of amoeboid movement, cytoplasmic streaming, cytokinesis, and so on. Then several pioneering papers¹⁻³ established that slime molds and other cells possess protein molecules quite similar to the actin and myosin that power muscle contraction. In the next few years, a handful of largely youthful

investigators (including the authors of this review, who had been postdocs together with Ed Korn at the National Institutes of Health [NIH]) demonstrated the generality of these findings and established many of what remain today general principles in the field.

"Although the field was very young in 1973, our review was the size of a small book. It must have filled an information void. Since *CRC Critical Reviews in Biochemistry* was new and not generally available (for photocopying), we received many requests for reprints. This presented two problems: first, the publisher would not sell us reprints (I suppose that they were trying to promote the sales of their new journal); and, second, we did not have research funds to purchase reprints, since everyone's grants had been cut following President Nixon's impoundment of part of the NIH budget. Consequently, we decided to invest our honorarium and some personal funds in several hundred copies produced by the Harvard Printing Office. To make up our losses, we requested a \$1.00 donation for each reprint. A few kind souls replied.

"So, in the end, the review was distributed, not as a journal article, but largely by privately financed reprinting and mailing together with the widespread use of photocopying. Judging from the number of tattered photocopies that I have seen, the review appears to have been the primer for many new investigators who entered the field in the mid-1970s.

"Reviews on cytoplasmic contractile proteins are no longer a novelty (see, for example, reference 4) but short of writing a large monograph, no one could now attempt a comprehensive review like ours in 1974. I doubt that anyone has actually read the review for several years now, but it is still cited, perhaps as an historical landmark at the end of the dark ages."

1. Hatano S & Oosawa F. Isolation and characterization of plasmodium actin. *Biochim. Biophys. Acta* 127:488-98, 1966. (Cited 165 times.)
2. Adelman M R & Taylor E W. Further purification of slime mold myosin and slime mold actin. *Biochemistry—USA* 8:4976-88, 1969. (Cited 120 times.)
3. Ishikawa H, Bischoff R & Holtzer H. Formation of arrowhead complexes with heavy meromyosin in a variety of cell types. *J. Cell Biol.* 43:312-28, 1969. (Cited 750 times.)
4. Pollard T D. Cytoplasmic contractile proteins. *J. Cell Biol.* 91:156s-65s, 1981.