Evidence that intracellular calcium ions act as mediators of physiological and developmental processes in higher plants is reviewed. The article attempts to integrate the physical/chemical properties of the calcium ion with its numerous activities within the cell, thus providing a rationale for understanding primary aspects of signal transduction. [The SCI indicates that this paper has been cited in more than 405 publications.]

Calcium and Signal Transduction in Plants

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Although calcium had long been known to be essential for plant growth, especially in cross-linking acidic cell wall polysaccharides, it was only in the 1970s that researchers began to realize that it might be involved as a cytoplasmic factor in stimulus/response coupling. Hereinafter, research on signal transduction had focused on the possible direct interaction between plant growth regulators and nucleic acid metabolism with little thought to ions and membrane transport activity as carriers of information. Given the extensive involvement of calcium in a variety of physiological (e.g., muscle contraction) and developmental (e.g., fertilization) processes in animal systems it seemed only natural that the ion would have a similar role in plants. Studies from Lionel Jaffe and coworkers and from Winslow Briggs, editor of Annual Review of Plant Physiology, on schedule, but just barely.

We think the review, by pulling together a loosely knit body of information, synthesized a cohesive and novel argument that is important for understanding stimulus/response coupling in plants. These qualities, together with its projection of excitement, have been appreciated by readers who favored its citation. Both of us have been repeatedly flattered by researchers who have praised the review, finding it easy to read and informative, even several years after publication. However, the subject of signal transduction continues to flourish and thus there are several current reviews that illustrate many new insights, such as the recent article by D. M. Roberts and A. C. Harmon on calcium binding proteins in higher plants.


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