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The authors found that auxin stimulated ethylene production, and that it was the gas which promoted abscission after the ability of auxin to delay aging was lost. This paper provided experimental proof for the principle that ethylene could act as a second messenger in some of the effects of auxin on plant growth and development. [The *SCI*® Indicates that this paper was cited 139 times in the period 1964-1977.]

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"When I arrived at Fort Detrick in 1963, all I knew of abscission was that it occurred in the fall and that I wasn't exactly sure how to spell the word. I had just finished graduate school at the University of Minnesota and had an obligation to serve in the U.S. Army. My coworker on this paper was another lieutenant. Bernie Rubinstein, who had just finished a master's thesis on leaf abscission at Purdue University. After the work reported here was completed, Bernie went to graduate school at the University of California, Berkeley, and then to the University of Massachusetts where he is currently Professor of Botany. Bernie had an excellent grasp of the literature and, inspired by an excellent review by Stanley Burg,[1] had ordered a gas chromatogaph to measure ethylene production from plants. At that time only a few labs had this instrument available for ethylene studies, or in fact were even interested in ethylene research. It was, and still is, hard to think of a simple two-carbon gas as a plant hormone. In my opinion, a good deal of our success was due to the simple fact that we had a new tool to study an old problem.

"Our research was devoted to studying a paradox. Auxin (indoleacetic acid, a plant hormone) prevented abscission of debladed petioles when it was applied shortly after removal of the leaf blade. However, when it was applied four hours later, it stimulated abscission. How could one hormone have such divergent effects over a four-hour time span? With the aid of the gas chromatograph, we were able to show that auxin caused the plant to produce a great deal of ethylene. Since it was already known that ethylene was a powerful defoliant, it was a simple matter to show that the abscission-promotive effect of auxin was probably due to the enhanced ethylene production. The abscission-retarding effect of auxin, on the other hand, was due to its ability to delay aging or senescence, and the paradox of auxin action on abscission could be explained by its dual ability to delay aging on one hand and stimulate ethylene production on the other.

"A reexamination of the literature revealed the fact that Crocker et al.[2] in 1935 originally discovered the fact that auxin stimulated ethylene and at that time they suggested that some of the effects of auxin were simply due to its ability to enhance ethylene production.

"Our paper provided experimental proof that ethylene was capable of acting as a second messenger in plants and that auxin-enhanced ethylene production explained the ability of auxin to stimulate abscission. In my opinion, our paper has been cited so frequently because we provided clear experimental verification of a general concept in hormone physiology by studying the special case of leaf abscission "

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