

Sachs T & Thlmann K V. The role of auxins and cytokinins in the release of buds from dominance. *Amer. J. Bot.* 54:136-44, 1967.

[Biological Labs., Harvard University, Cambridge, MA]

Localized hormonal treatments cause the growth of inhibited buds on intact plants. Both auxin and kinetin are effective, though on different aspects of bud development. Growing shoots are relatively insensitive to correlative inhibition and rapid overall growth is associated with increased branching. [The SC<sup>1</sup>® indicates that this paper has been cited in over 150 publications since 1967.]

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"The removal of a growing shoot increases the growth of some of the remaining buds. This quantitative relation is an almost universal, readily observable example of the correlative relations between parts that play a major role in biological form and organization. Concrete knowledge is available, furthermore, concerning possible hormonal signals in this correlation. Auxin replaces young leaves, which produce auxin, in inhibiting bud growth and cytokinins release buds inhibited by auxin. At the time the work was carried out, however, there were conflicting reports concerning the effects of auxin, the role of cytokinins in the plant was not known, and conditions in which branching occurs even on intact plants had not been carefully considered.

"The paper reports about half the results of a thesis supervised by the coauthor. It attempts a general view of various causes of the release and growth of buds rather than their more commonly considered inhibition. The direct local application of auxin was shown to promote inhibited internode elongation under specific conditions. A method

for the direct application of cytokinins to buds, causing the partial release of buds inhibited by a growing shoot, was described and studied. The related generalizations that branching increases with overall growth rate and that growing buds are relatively insensitive to inhibition were shown to account for many previous reports and to resolve apparent contradictions.

"Perhaps the paper was cited because it did not concern only one hormone or detail but rather attempted to provide a wide coverage at a stage when much was known and a summary badly needed. It could therefore be treated as both a review and an original work. Another important factor is that the coauthor is the authority in this field, in whose laboratory the major hormonal effects were first discovered: both bud inhibition by auxin and its release by cytokinins. It may also be relevant that the paper was not remarkably original or daring, but rather dealt with a recognized, much debated problem, though from a new angle.

"The work as it was first submitted started with the most original part, the one dealing with the relation of growth rate to bud release, written as an introductory review. This part contained only ideas and no numbers and it had to be compressed in the discussion. The facts reported have withstood the test of time, as has the general attitude that hormonal interactions and feedback play a role in developmental correlations. A major point we missed was that cytokinins may be signals of growing roots and are not necessarily produced locally in buds, but this could make the hypothesis simpler and more attractive. Work on the correlative relations of buds has continued and many new facts have been found;<sup>1</sup> a more recent account should appear shortly in the *Encyclopedia of Plant Physiology*. It is my feeling, however, that much of this work has stressed evidence inconclusively supporting one hypothesis or proving that another cannot account for all aspects of bud development. I would suggest that positive proof that a given mechanism plays a role might be more useful.<sup>2</sup> Published work has also stressed the mechanism of hormone action to the exclusion of considerations of the role of hormones in plant organization."<sup>3</sup>

1. Phillips I D J. Apical dominance. *Annu. Rev. Plant Physiol.* 26:341-67, 1975.

2. Sachs T. A control of bud growth by vascular tissue differentiation. *Isr. J. Bot.* 19:484-98, 1970.

3. .... Plant tumors resulting from unregulated hormone synthesis. *J. Theor. Biol.* 55:445-53, 1975.