

Carpenter W D & Beevers H. Distribution and properties of isocitritase in plants. *Plant Physiol.* 34:403-9, 1959.
[Dept. Biological Sciences, Purdue Univ., Lafayette, IN]

Isocitritase, one of the distinctive enzymes of the glyoxylate cycle, was present in tissues of seedlings converting stored lipid to carbohydrate but absent from other plant tissues. This supported the proposed role of the glyoxylate cycle in gluconeogenesis from acetate. [The SCI® indicates that this paper has been cited in over 130 publications since 1961.]

W.D. Carpenter
Environmental Policy Staff
Monsanto Company
St. Louis, MO 63167

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"This paper was the first of a series on the glyoxylate cycle in plants. These studies examined in detail the mechanisms that allow for the net conversion of lipid to carbohydrate that is the hallmark of the metabolism of fatty seedlings such as castor bean.

"The foundation for the work described in this paper was laid by the work of Beevers and Kornberg.¹ Prior to that time, my thesis was to have concerned lipid synthesis in castor bean under Beevers. However, his work with Kornberg while on sabbatical leave in Oxford in 1957 pointed to a role for the recently described glyoxylate cycle² in fatty seedlings, and this provided a new direction for my research.

"The paper is cited frequently because it was the first in which the distribution and properties of one of the distinctive enzymes of the glyoxylate cycle, isocitritase (isocitrate lyase), was examined in plants. It soon became clear that this enzyme is not generally distributed in plant tissues. Instead, it was apparently restricted to those seedling tissues in which lipid is stored.

The enzyme appeared only after germination had begun, reached peak activity at the time breakdown of stored fat was most rapid, and declined to zero when utilization was complete. Thus, there was strong presumptive evidence that the glyoxylate cycle was indeed an essential stage in the conversion of fat to sugar, a contention proved later by *in vivo* experiments with labeled acetate.³ My work with the enzyme was greatly helped by a generous gift of D-isocitrate lactone from H.B. Vickery, who had isolated it in large amounts from bryophyllum leaves.

"Beevers's laboratory was already recognized as a center of excellence in several areas of plant physiology, particularly in organic acid metabolism. The stimulating atmosphere provided by Beevers was shared with several graduate and postdoctoral students including Benedict, Canvin, Stiller, ap Rees, Gaur, and others. I was particularly fortunate to participate in the ongoing research program and to make the first of the studies which led eventually to the discovery of the glyoxysome, the organelle in which each of the five enzymes of the glyoxylate cycle is located.⁴

"Further studies carried out by Beevers's group directed to other enzymes of the cycle provided an elegant mechanism and overall insight into this unique pathway.

"From my perspective, it was a challenge and an opportunity to be part of Beevers's group. The paper represented a new thrust that resulted in establishing a biochemical pathway and a new aspect of metabolic compartmentation. These developments have been reviewed recently."⁵

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3. Canvin D T & Beevers H. Sucrose synthesis from acetate. *J. Biol. Chem.* 236:988-95, 1961.
4. Breidenbach R W & Beevers H. Association of the glyoxylate cycle enzymes in a novel subcellular particle from castor bean endosperm. *Biochem. Biophys. Res. Commun.* 27:462-9, 1967.
5. Beevers H. The role of the glyoxylate cycle. (Stumpf P K, ed.) *The biochemistry of plants: a comprehensive treatise. Volume 4. Lipids: structure and function.* New York: Academic Press, 1980. p. 117-31.