

Endogenous biosynthetic precursors of (+)-abscisic acid. VI. Carotenoids and ABA are formed by the 'non-mevalonate' triose-pyruvate pathway in chloroplasts

B. V. Milborrow and H.-S. Lee

Abstract

A cell-free system from avocado fruit which routinely incorporated [¹⁴C]mevalonate into ABA (1000 dpm per 5 mL of preparation), and into carotenoids, has now been shown to incorporate [¹⁴C]pyruvate even more successfully (1620 dpm). Intact chloroplasts from spinach leaf protoplasts incorporated 2990 dpm of [¹⁴C]pyruvate (from 2 x 10⁶ dpm) into ABA compared with 990 dpm from [3-*R*-5-¹⁴C]mevalonate (also from 2 x 10⁶ dpm). The intact chloroplasts also produced [¹⁴C]ABA (1575 dpm) when supplied with [¹⁴C]isopentenyl diphosphate. This result establishes that the whole pathway of biosynthesis of ABA can occur within chloroplasts. Little [¹⁴C]acetate or [¹⁴C]alanine was incorporated into ABA by avocado fruit mesocarp. Most of the ABA in leaf tissue now appears to be formed by the triose-pyruvate pathway in chloroplasts and incorporation of [¹⁴C]mevalonate occurs after activation in the cytoplasm and importation of a later intermediate into the plastids.

Keywords: abscisic acid; triose-pyruvate pathway; non-mevalonate biosynthesis; cell-free system; chloroplasts; IDP.

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