

Are Flavanones Intermediates in Flavonoid Biosynthesis?

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CHALCONES and flavanones have been shown to be precursors for many classes of flavonoid compounds.¹ Enzymic and *in vitro* feeding experiments, however, show that chalcone and (-)-flavanone are interconvertible, and the question still remains as to whether both are directly involved as intermediates in flavonoid biosynthesis.

the products from (a) are higher than those from (b). Furthermore, within each experiment, the specific activities of these compounds follow closely that of the chalcone but not that of the (-)-flavanone.

These results strongly suggest that, contrary to expectations,³ flavones and isoflavones are formed

TABLE

Specific activities of flavonoid compounds from clover seedlings fed [¹⁴C]chalcone or flavanone*

Precursor†	liquiritigenin	isoliquiritigenin	4',7-dihydroxyflavone	daidzein	formononetin
(a) [¹⁴ C]isoliquiritigenin + (-)-liquiritigenin	84	163	133	119	36
(b) (-)-[¹⁴ C]liquiritigenin + isoliquiritigenin	151	64	67	52	25

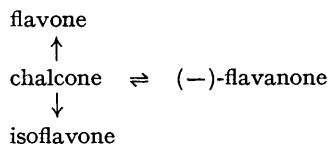
* Counts per min./μmole × 10⁻³, counting efficiency 23.5% (Beckman Lowbeta II counter).

† Specific activity 199 counts per min./μmole × 10⁻³.

Parallel competitive feeding experiments in which either (a) [¹⁴C]isoliquiritigenin (2',4,4'-trihydroxychalcone) diluted with an equal amount of (-)-liquiritigenin² (4',7-dihydroxyflavanone), or (b) (-)-[¹⁴C]liquiritigenin diluted similarly with isoliquiritigenin were fed to subterranean clover seedlings (*Trifolium subterraneum*) have been carried out. The radioactive products, 4',7-dihydroxyflavone, daidzein (4',7-dihydroxyisoflavone), and formononetin (7-hydroxy-4'-methoxyisoflavone) were isolated and purified by paper chromatography and their specific activities determined (Table).

The results show that the specific activities for

more directly from the chalcone, with the (-)-flavanone functioning as precursor only *via* isomerisation to the chalcone. The biogenetic relationships can be summarised as follows:



The relative roles of chalcone and (-)-flavanone in flavanone biosynthesis are under study.

(Received, February 15th, 1968; Com. 185.)

¹ H. Grisebach, "Chemistry and Biochemistry of Plant Pigments" (T. W. Goodwin, ed.), Academic Press, London, 1965, p. 279.

² E. Wong and E. Moustafa, *Tetrahedron Letters*, 1966, 3021.

³ L. Patschke, W. Barz, and H. Grisebach, *Z. Naturforsch.*, 1966, **21b**, 201; E. Moustafa and E. Wong, *Phytochem.*, 1967, **6**, 825; H. Grisebach and W. Bilhuber, *Z. Naturforsch.*, 1967, **22b**, 747.