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FLAVANONE BIOSYNTHESIS

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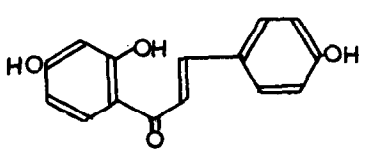
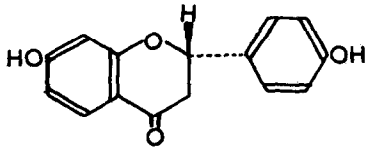
The key position of chalcones in the biogenesis of flavonoid compounds is now well established (1). The isomeric flavanones very probably represent the primary heterocyclic intermediate in the evolution of these compounds. In vitro, chalcones and flavanones are readily interconvertible. An equilibrium between these compounds exists in aqueous solution which in the case of chalcones with a phloroglucinol type ring A, lies almost entirely on the side of the flavanone (2). In vivo, the formation of flavanone from chalcone must be enzyme catalysed since natural flavanones occur in optically active forms (3). We now report the existence in soybean seedlings (Soja hispida) of an enzyme which catalyses the conversion of 2',4,4'-trihydroxychalcone (isoliquiritigenin) (I) to (—)-4',7-dihydroxyflavanone (liquiritigenin) (II) (4).



(I)



(II)

A partially purified enzyme (250 mg) prepared by ammonium sulphate precipitation and calcium phosphate gel treatment (purification about 50 fold), was incubated for 30 min. with isoliquiritigenin (300 mg) in 0.05 M tris-HCl buffer (800 ml), pH 7.5, at 37°. The reaction product was isolated by means of ether extraction and polyamide column chromatography (yield 210 mg). Recrystallisation from aqueous ethanol yielded colourless needles, m.p. 204-8° (synthetic liquiritigenin, m.p. 207-8°(5)); acetate derivative, m.p. 184-6° (liquiritigenin acetate, m.p. 185°(5)). The flavanone showed typical colour reaction with sodium borohydride and was identical with synthetic liquiritigenin in chromatographic behaviour and UV spectral properties. Liquiritigenin, in the form of glycosides, has been found to occur naturally as the (—)-enantiomer (4,6). The enzymic product isolated by us was optically active, $(\alpha)_D^{20}$ — 9° (c=1%, ethanol). Results of blank experiments in which heat inactivated enzyme or buffer alone were used showed that very little spontaneous isomerisation occurred under the experimental conditions used.

Further purification and study of the properties of this chalcone-flavanone isomerase is in progress.

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