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HASHISH COMPONENTS. PHOTOCHEMICAL PRODUCTION OF CANNABICYCLOL FROM CANNABICHROMENE

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Revision of the proposed structure for cannabicyclol[1,2] has been suggested.[3] We now report that cannabichromene (II)[3,4,5] can be converted into cannabicyclol by photochemical means: this supports the revised structure (I, R = n-C_5H_{11}) and provides a convenient preparative method.

Cannabichromene (750 mg.) in tert. butanol-acetone (1:1, 180 ml.) was irradiated for 4½ hr. (450 Watt Hanovia lamp, Pyrex deep well, nitrogen). After chromatography on Florisil (90 g.) cannabicyclol (340 mg.), and recovered chromene (150 mg.), were isolated by elution with light petroleum containing 1% and 2.5% ether. Crystallised from pentane, the former, m.p. 145-146°, was found to be identical (I.R., N.M.R., T.L.C., V.P.C. and mixed m.p.) with cannabicyclol of natural origin.

The N.M.R. doublet (D) due to the benzylic 3-proton (τ 6.93) shows only slight long-range splitting, and is coupled with the cyclobutane proton at C_2 (quartet E, τ 7.46, $\underline{J}_1$ 9.5, J_2 7.5 c/s. as shown by decoupling (100 Mc/s.): irradiation near 6.9 partially collapses the quartet. The C_2 proton is coupled with a second proton (C_4) which lies beneath the benzylic methylene signals (F) of the n-amyl. This can be seen more clearly in the synthetic analogue (I, R = OH)[6] in which screening by the n-amyl resonances is avoided. (Broad doublet, τ 7.71 $\underline{J} \sim 7$ c/s., one proton) (60 Mc/s., pentadeuteriopyridine). These results are not in accordance with the alternative structure (III) arising from 1,2-cyclisation. Cannabicyclol and cannabichromene* from the crude drug, when pure, show no apparent rotation. Cannabichromene could originate as a natural product through non-stereospecific (non-enzymic?) processes, and cannabicyclol could form as a result of natural irradiation in the plant, with other constituents acting as sensitisers. On the other hand, the possibility arises that both components are artefacts formed in the crude drug: further work is needed.

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* The crystalline cannabichromene previously reported[7] is an impurity (personal communications from Dr. U. Classen to R.M.).

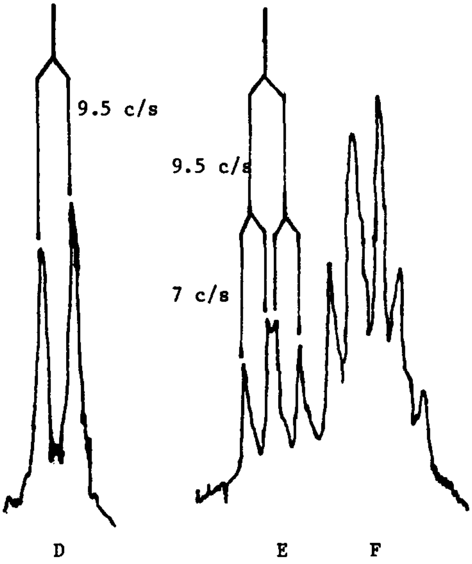
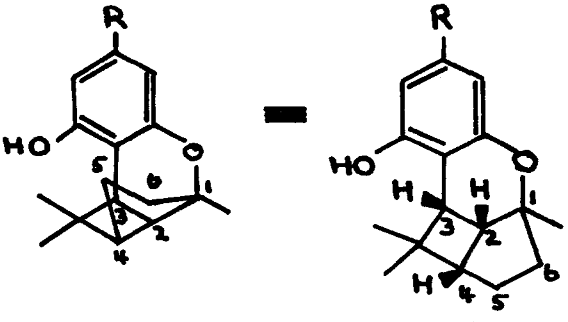
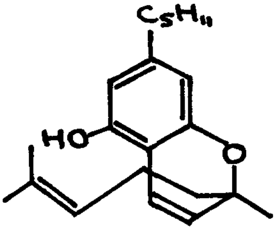


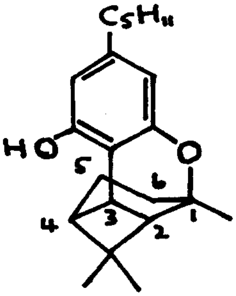
Fig. 1. N.M.R. Spectrum of Cannabicyclol (220 Mc/s., $CDCl_3$)



(I) (I)



(II)



(III)

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