

SYNTHESIS OF (±) CYANOMACLURIN TRIMETHYL ETHER

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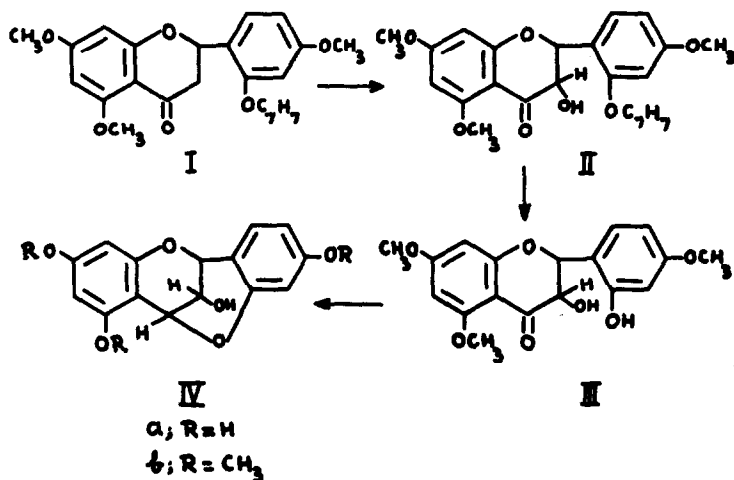
Cyanomaclurin (IVa) the chief constituent of Indian Jack tree has been known<sup>1</sup> for a long time. Robinson very early recognised it as a leucoanthocyanidin derivative, but gave it a semi-ketal<sup>2</sup> structure. Its structure has been revised recently<sup>3,4,5</sup> on the basis of N.M.R. data and the revised structure has been supported by the synthesis and study of closely related structures<sup>6</sup>. We wish to report here a synthesis of (±) O-trimethyl cyanomaclurin (IVb) as a final confirmation of the structure.

The synthesis follows essentially the route described earlier by us for some model compounds having the same skeleton<sup>6</sup>. The benzyloxy flavanone (I) gave on oxidation with alkaline hydrogen peroxide a mixture which contained (T.L.C.) three products besides some recovered flavanone and the corresponding chalcone produced by flavanone ring opening. Chromatography on silica gel separated these new products. (1) The 3-hydroxy flavanone (II), obtained as colourless needles from methanol, m.p. 143-4°,  $\lambda_{\text{max}}^{\text{MeOH}}$  284 m $\mu$ , gave a pinkish colour with magnesium and hydrochloric acid and deep pink colour with zinc and hydrochloric acid.

The second colour reaction agrees<sup>7</sup> with its structure as II.

(2) The corresponding flavonol, colourless needles from ethylacetate, m.p. 163-4°,  $\lambda_{\text{max}}^{\text{MeOH}}$  247, 337 m $\mu$  (shifting to 260, 396 m $\mu$  with AlCl<sub>3</sub>) also gave a pink Mg-HCl reaction and green ferric reaction. (3) The corresponding aurone obtained as yellow needles from ethanol melted at 165-6°,  $\lambda_{\text{max}}^{\text{MeOH}}$  254, 402 m $\mu$  (unaffected by addition of AlCl<sub>3</sub>). It did not give any colour with magnesium and hydrochloric acid nor with alcoholic ferric chloride.

Catalytic debenzoylation of (II) furnished the hydroxy dihydroflavonol (III), colourless cubes from methanol, m.p. 186-7° (after drying at 100°); it gave deep pink colour with zinc and hydrochloric acid. Further reduction of (III) with excess sodium borohydride in aqueous alcoholic solution buffered with boric acid and cyclisation of the intermediate flavan-3:4-diol directly under acidic conditions gave (†) cyanomaclurin trimethyl ether (IVb) as colourless cubes from ethyl acetate-light petroleum, m.p. 168-9° (Found: C, 65.6; H, 5.4; C<sub>18</sub>H<sub>18</sub>O<sub>6</sub> requires C, 65.5; H, 5.5%). It agreed fully with the methyl ether of the natural sample in ultraviolet and infrared (CCl<sub>4</sub>) and also gave the same R<sub>f</sub> on T.L.C. The acetate of the synthetic sample came out as colourless needles from ethyl acetate light petroleum, m.p. 178-9° and this also had the same R<sub>f</sub> on T.L.C. as that of the acetate of the natural sample and their ultraviolet spectra were identical.



The melting points of the methyl ethers of the natural sample need some comment. The melting point reported by the earlier workers is 75-85° (acetate m.p. 185-6°). This sample seems to be a mixture of the optically active and the racemic substance as Chakravarty and Seshadri<sup>3</sup> separated it into two fractions, one optically active (m.p. 75°) and another racemic (m.p. 145°). It is possible that the reported racemic substance (m.p. 145°) is still optically impure and when purified further its melting point may be expected to agree with that of the synthetic sample. But this sample of the methyl ether is not available and attempts are being made to isolate a fresh sample. Racemic cyanomaclurin (m.p. 158-9° with 1 mole water) has been

separated from the natural sample by Freudenberg and Weinges<sup>8</sup> but no methyl ether of this sample has been reported.

Our thanks are due to Prof. Sir Robert Robinson for suggesting this work and for his continued interest in its progress.

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