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PARTIAL SYNTHESIS OF KOLAVELOOL AND HARDWICKIIC ACID*

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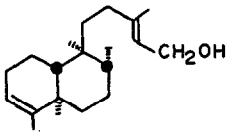
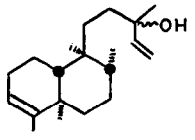
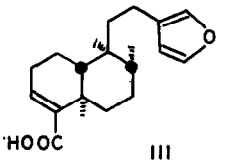
In continuation of our earlier work[1,2] on the diterpenoids from the oleo-resin of Hardwickia pinnata, we report on the partial synthesis of kolavelool (II) and hardwickiic acid (III) from what is likely to be their immediate precursor in nature, viz. kolavenol (I).





II



III

Kolavelool

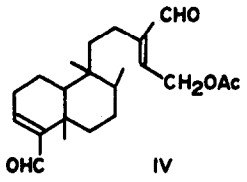
The occurrence of a tertiary allylic isomer of kolavenol in the oleo-resin of Hardwickia pinnata has already been reported[1]. The partial synthesis to be described, besides confirming its structure, also settles its absolute stereochemistry at all centres except at C_{13}.

Kolavenol (I) on MnO_2 oxidation (pet. ether) furnished the corresponding aldehyde (λ_{max}^{EtOH} 238 mμ , ε 13230), which on epoxidation (H_2O_2, NaOH-MeOH, 0°) furnished the 13,14-epoxy-kolavenal. Treatment of the latter compound with hydrazine hydrate[4] and AcOH at 0-15° furnished a complex product, from which the chief component (n_D^{30} 1.5130, $[\alpha]_D^{24}$ -40.4° in $CHCl_3$) could be isolated by preparative layer chromatography and identified (IR,PMR) as the naturally occurring allylic isomer of kolavenol. We have named this compound kolavelool* (cf.geraniol-linalool).

*Presented at the IUPAC, 4th International Symposium on the Chemistry of Natural Products, Stockholm (1966). We have been prompted to report on our findings in view of a recent publication by King and Rodrigo[3].

Hardwickiic acid

Kolavenyl acetate (n_D^{30} 1.5011, $[\alpha]_D^{29}$ -45.7° in $CHCl_3$) on treatment with SeO_2 (2.2 mole equiv.) in AcOH at reflux gave a product, in which the expected IV predominated. The crude product was taken up in MeOH and shaken with Amberlyst-15[5] (48 hr)



IV

to give a material, TLC of which showed two furan-containing products (spraying with Ehrlich reagent[6]) which were separated (column chromatography) and the major one (higher R_f) identified (IR, TLC, GLC) as methyl hardwickiate*.

*In this reaction we had anticipated only furan ring-closure (ester exchange, followed by hemi-acetal formation and dehydration to a furan) and the oxidation of C_4-aldehyde function was totally unexpected. In an experiment in which any oxygen had been scrupulously avoided (O_2-free N_2 and de-oxygenated MeOH), conversion to the ester again occurred.

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5 Product of Rohm and Haas Co., USA.

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