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MEDICINAL PLANTS OF GHANA: IDENTITY OF ALKALOID FROM FAGARA XANTHOXYLOIDES

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R.Paris and H.Moyse-Mignon(1) isolated from the root-bark of Fagara Xanthoxyloides an alkaloid "A2" to which they assigned the formula $C_{23}H_{25}NO_5$. Following the same experimental procedure we have isolated this alkaloid and obtained a molecular formula of $C_{23}H_{23}NO_5$ from elemental analysis of the base and its sulphate and from an exact mass determination(2) by mass spectrometry.

The base forms cream coloured crystals which on heating melt at 200 to 202°, resolidify on continued heating and melt again at 239 to 242°.

Analysis indicated the presence in the molecule of two methoxyl groups, responsible for the infra red spectral bands at 2850, 1460, and 1335 cm^{-1}. A methylene dioxy grouping(s) was indicated by a positive Labat test and absorptions at 2780, 944 and 723 cm^{-1}. There were no bands in the infra red spectra corresponding to either an -NH- or carbonyl grouping

The U.V. spectrum exhibited a striking similarity to that of chelerythrine(3), with λ_{max} (95% EtOH) 228, 284 mμ, log ε 4.53,

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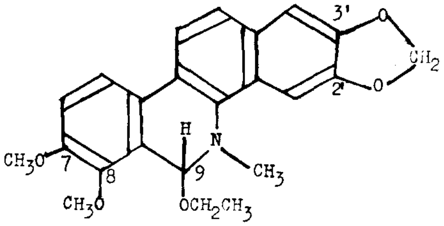
4.67; $\lambda_{\text{inflexion}}$ 320 mμ., log ϵ 4.18 ; and λ_{min} 252 mμ., log ϵ 4.18.

The peculiar melting behaviour, the chromatographic rate of migration, and other physical characteristics suggested, from their similarity to those reported in the literature(4), that the base was 9-ethoxychelerythrine(I)



I

The structure I was supported by the PMR spectrum, which exhibited the expected multiplets centred at 1.12 p.p.m. and 3.37 p.p.m. due to the CH_3- and -CH_2- of the 9-ethoxy group, single peaks at 2.78 p.p.m. (the N -methyl group), 3.91 p.p.m. (the 8-position methoxyl), 3.99 p.p.m. (the 7-position methoxyl), 5.69 p.p.m. (the lone 9-position proton), 6.03 p.p.m. (the methylene dioxy group) and a six aromatic proton peak system in the 7.5 p.p.m. region. The chemical shifts were determined in deuterochloroform at 60 mc. relative to tetramethylsilane and all the peaks had appropriate intensities.

In view of the fact that 9-ethoxychelerythrine is readily formed by treatment of chelerythrine salts with ammonium hydroxide, followed by recrystallisation of the crude product from ethanol, a procedure which had been employed in the isolation of the base, it seemed extremely likely that the natural alkaloid is chelerythrine and that the isolated ethoxy derivative is an artefact, a possibility supported, though not decisively, by the observation that it was obtained in racemic form.

Appropriate treatment of the petroleum ether extracts obtained in the usual preliminary "defatting" of the plant material yielded chelerythrine in significant quantities. Its identity was established from its U.V. spectrum, chromatographic comparison with an authentic specimen, and by preparation of derivatives with melting points in agreement with the literature values(4). These included a nitrate, pseudocyanide, dihydroderivative, and 7,8,2',3'-tetramethoxy-9,10-dihydro-10-methyl-1,2-benzophenanthridine.

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