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SEPARATION AND CHARACTERISATION OF THE ALKALOIDS OF SARCOCOCCA PRUNIFORMIS

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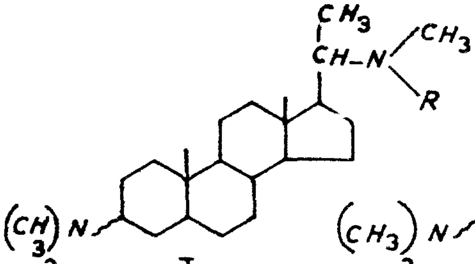
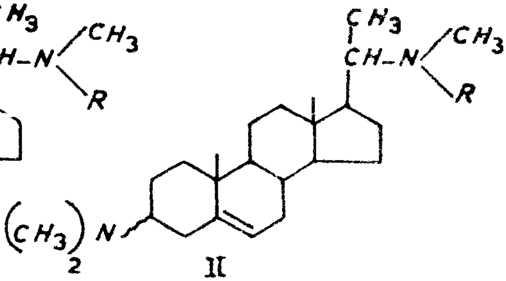
Presence of an alkaloidal principle m.p. 236° in Sarcococca - pruniformis was first reported by Chopra and Handa.[1] In a later examination of this plant Edwards and Handa[2] reported an alkaloid m.p. 238° and proposed structure II for it on the basis of NMR studies and Hofmann degradation to a conjugated diene. In the present reinvestigation of this plant the alkaloidal fraction of the plant extract was found to be a mixture of several components from which the following crystalline constituents could be isolated. Alkaloid A, m.p. 245-246°; Alkaloid B, m.p. 232-33°; Alkaloid C, m.p. 151-153° along with a noncrystalline but paper chromatographically pure alkaloid m.p. 180-185°. Alkaloids A and B had very similar physical properties and their seperation could only be effected by repeated chromatography on alumina using gradient elution technique. The purity of these two alkaloids could be established by paper chromatography on formamide impregnated paper, and (with much better resolution) of the products obtained by lithium aluminium hydride reduction of the two on phosphate buffer impregnated paper.

IR Spectra of the two alkaloids were also very similar and both showed the presence of amide carbonyl (6.2µ). Ultraviolet spectrum of B further shows a very definite absorption at 213 mµ. Alkaloid A analysed for $C_{26}H_{46}N_2O$ and alkaloid B for $C_{26}H_{44}N_2O$[3]. Mass spectra gave a molecular weight of 402 and 398 respectively which supports the above molecular formulae.

These spectroscopic and analytical data indicated that alkaloids A and B had structures I and II respectively. Presence of similar alkaloids in other members of the Buxaceae family has recently been reported.



I



II

I : $R = -\overset{\overset{O}{\|}}{C}-CH_3$

Ia: $R = -CH_2-CH_3$

II : $R = -\overset{\overset{O}{\|}}{C}-CH_3$

IIa: $R = CH_2-CH_3$

The acyl group could not be removed on treatment with alkali but reduction with lithium aluminium hydride gave Ia and IIa respectively. Hofmann degradation of Ia gave a product m.p. 107-9° which analysed for $C_{23}H_{39}N$. The second nitrogen could not be eliminated by the Hofmann method, but a nitrogen free compound was obtained by Emde degradation of the Hofmann base. This could be a mixture of Δ^2 and Δ^3 pregnenes*. The identity of this unsaturated compound could be established by infrared comparison with the compound obtained by detosylation of the tosyl derivative of 3β-hydroxy pregnane, prepared according to Haworth's procedure[4].

Alkaloid B is present in smaller amounts in the mixture of A and B, therefore, enough of this material was not available for the above degradations. However, when this mixture (of A & B) was degraded as outlined above, a product m.p. 67–70° was obtained which gave a red colour with 90% trichlorocetic acid[5] and UV absorption for 3,5 dienes. Alkaloid B thus appears to have structure II.

Recently Kikuchi and collaborators[6,7,8] reported isolation of similar alkaloids from Pachysandra terminalis SIEB. et ZUCC. On the basis of NMR spectrum and similarity of properties of the desacyl epipachysamine-A and its N-methyl derivative with those of 3β-dimethylamino-20α methylamino-5α-pregnane[9] and the 20α-dimethylamino analogue,[10] they have assigned structure I to epipachysamine-A[8] m.p. 203-205°. However, no direct comparison appears to have been made. Furthermore, they have not compared the infrared spectrum of the above N-methyl derivative, obtained from desacyl-epipachysamine-A, with that of the corresponding 3α-dimethylamino compound (Base-X,N-methyl-pachysamine-A).

Knaack and Geissman[11] have also reported similar alkaloids from Pachysandra terminalis. However, it appears that they could not separate the saturated alkaloid from the one with △5 double bond, nor they have given any melting points.

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3. Hydrogenation value also corresponded with one double bond in alkaloid II

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12. All the melting points were taken on koffler block and are not corrected.

*. Mass spectrum gave the required molecular weight 286. Satisfactory analytical values were obtained for all the compounds reported above.