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THE ALKALOID OF THE LEAVES OF ALSTONIA SCHOLARIS R. Br.

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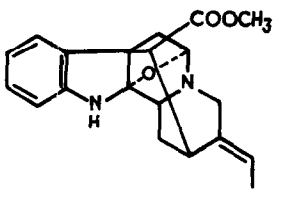
Alstonia scholaris (Fam : Apocynaceae) has so far furnished only two indole alkaloids (1), echitamine (2) and echitamidine(3). We like to report in the present communication the structure of another indole base, alkaloid A, isolated from the leaves of this plant.

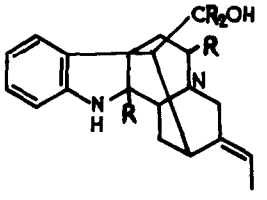
Alkaloid A, $C_{20}H_{22}N_2O_3$, m.p. 223-25° (dec.), $[\alpha]_D$ -47° ($CHCl_3$), is a tertiary weak base with pKa, 5.72 (ethanol-water) and forms a methiodide, $C_{21}H_{25}N_2O_3I$, m.p. 235-37° (dec.) and a yellow picrate $C_{26}H_{25}N_5O_{10}$, m.p. 172-74° (dec.). Analysis of functional groups indicates the presence of a methoxyl, about one C-methyl and only one active hydrogen atom. Saponification experiment and spectral data indicate that the methoxyl group in the base occurs as a carbomethoxyl ($\lambda_{max.}^{nujol}$ 5.78 μ, three proton singlet at 3.74δ). The active hydrogen in the alkaloid is associated with an -NH ($\lambda_{max.}^{nujol}$ 2.9 μ). Isolation of acetaldehyde as its DNPH derivative by ozonolysis of the base strongly suggests the presence of an ethylidene group in its molecule which is corroborated from its N.M.R. spectrum

(methine quartet centred at 5.44δ and methyl doublet around 1.58δ, J = 14 c.p.s.).

The dihydroindole ultraviolet spectrum of the base in ethanol ($\lambda_{max.}^{EtOH}$ 237, 287 mμ, logϵ, 3.90, 3.51) which changes to 3H- indolium type in presence of concentrated acid ($\lambda_{max.}^{70\% HClO_4}$ 239, 244, 305 mμ, logϵ, 3.65, 3.64, 3.67) suggests that the third oxygen atom is attached to the indoline α-position as a carbinolamine ether system as in the case of picraline (4) and pseudoakuammigine (5). The one proton signal centred at 4.92δ in the N.M.R. spectrum of the alkaloid can be attributed to one flanked between an oxygen and a nitrogen atom which incidentally suggests the termination of the ether oxygen to the carbon atom adjacent to $N_{(b)}$. Based on these data and from biogenetic consideration alkaloid **A** is proposed to have the structure (I).



I



II : R=H
III : R=D

Now if (I) represents the structure of the alkaloid it should be identical with desacetyldesformyl derivative of the Akuamma alkaloid picraline and in fact in the N.M.R. spectrum of the alkaloid **A** the proton signals associated with (I) appear essentially at the same positions as are observed in the spectrum of picraline (5).

Further support in favour of structure (I) for the alkaloid is provided by mass spectrometry. The mass spectrum of alkaloid A exhibits the molecular ion peak at m/e 338 in agreement with the formula $C_{20}H_{22}N_2O_3$. Lithium aluminium hydride reduction of the base furnishes a product (M = 296) the mass spectrum of which is revealing and shows a fragmentation pattern that would be expected from desformopicralinol (II, 6). The decrease in mass number by 42 mass units from the original base corresponds to the conversion of $-CO_2CH_3$ to $-CH_2OH$ and replacement of the amino ether oxygen bridge by two hydrogens during LAH reduction. The usual indole peaks are observed at m/e 130 (a), 143 (b) and 144 (c). The genesis of the ion fragments registered at m/e 166 (d) and 251 (e) may also be visualized in terms of structure II for the LAH reduction product.

The appropriate shifts of the ion fragments a, b, c, d and e to m/e 131, 145, 146, 169 and 253 respectively, observed in the mass spectrum of the lithium aluminium deuteride reduction product (III) of the alkaloid A, confirm the exact location of the ether bridge in the original base (I).

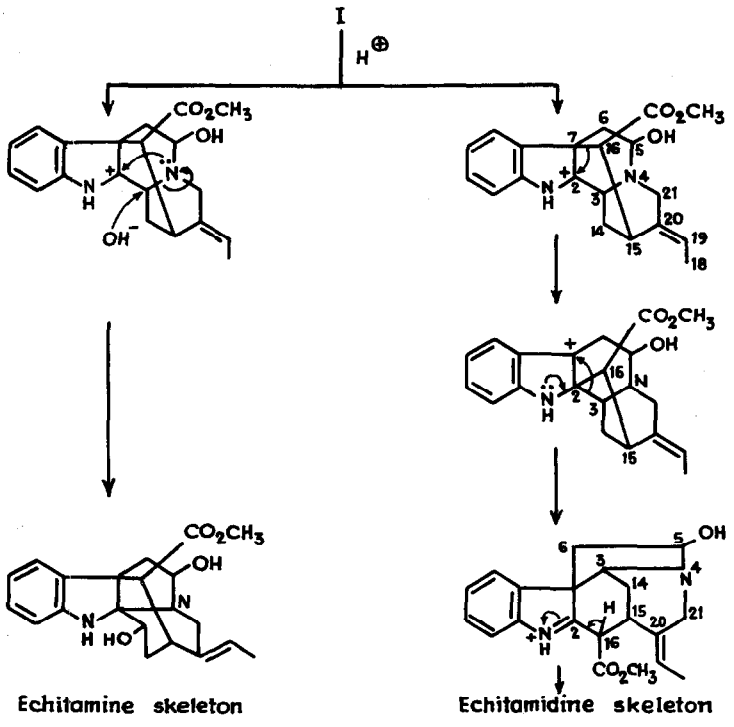
Finally the identity of the alkaloid A with desacetyldesformyl picraline (= picrinine) has been established from their superimposable infrared spectra and undepressed mixture melting point.

The isolation* of picrinine (I) from Alstonia scholaris

*Picrinine has recently been isolated from Rauwolfia vomitoria leaves by Dr. J. Poisson et al., Faculty of Pharmacy, University of Paris, Paris (Personal communication).

has an important biogenetic significance as it may be considered as an intermediate for the formation of both echitamine and echitamidine skeleton (Scheme I). The formation of flavopicraline (7), an acid rearrangement product of desacetylpicraline lends support to the interchange of positions by C-3 and C-16 atoms as has been envisaged in the scheme for the formation of echitamidine skeleton

SCHEME-I



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spectrum of alkaloid A with that of picrinine and for their mixed m.p. determination. Sincere thanks are due to the late Professor S. S. Dharmatti for the N.M.R. spectrum of the base. The investigation was supported by the grants-in-aid from C.S.I.R. (India).

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Note. The alkaloid (I) has also been isolated from Rauwolfia vomitoria by Prof. J.Poisson and his collaborators, France. (Personal communication).