Tetrahedron Letters No.23, pp. 2763-2766, 1968. Pergamon Press. Printed in Great Britain.

VENOTERPINE - A NEW MONOTERPENOID ALKALOID FROM THE FRUITS OF *ALSTONIA VENENATA* R.Br.

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(Received in UK 29 February 1968; accepted for publication 11 March 1968)

A recent publication by Arthur *et al*[1] on the structure of a monoterpenoid alkaloid (RW 47) from *Rauwolfia verticillata* (Lour.) Bail, has prompted us to record our independent observations on a monoterpenoid pyridine base isolated from the mature fruits of *Alstonia venenata* R.Br. which we have named venoterpine. Isolation of monoterpene alkaloids from apocynaceous plant is not new, but *A. venenata* is a unique example in which a monoterpene alkaloid is found to coexist with a rich source of C-19 indolic bases[2]. This cooccurrence of indole and monoterpene alkaloids in the same plant is of great significance as it offers circumstantial evidence in support of the current views on the biosynthesis of indole alkaloids[3,4].

Venoterpine, $C_9H_{11}NO$ (M^+, 149), m.p. 128-130°, λ_{max}^{EtOH} 259 mμ (log ε , 3.50) is a minor alkaloid (yield, 0.0008%) of the fruits of *A. venenata*. It is highly sensitive to light and air and turns purple on keeping. The structural assignment of venoterpine is largely based on its NMR spectrum (Fig. 1) which permits identification of all the eleven protons present in this rather simple molecule. The chemical shift values and the proton count of the four different sets of signals present in the spectrum suggest that venoterpine contains in its molecule,

i) 3-aromatic protons (7.15-8.36δ),
ii) 3-benzylic protons (2.70-3.45δ),
iii) 3-protons due to a benzylic methyl (around 1.38δ) and
iv) 2-protons due to a >CH-OH system (4.46-4.71δ).

The presence of the hydroxyl group in venoterpine is also indicated from its IR spectrum which shows a band at 3160 cm^{-1}. The strong IR absorption at 1600 cm^{-1} and particularly the UV absorption maximum of venoterpine which is very much similar to that of actinidine[5] suggest that the aromatic system of the alkaloid is due to a pyridine nucleus.

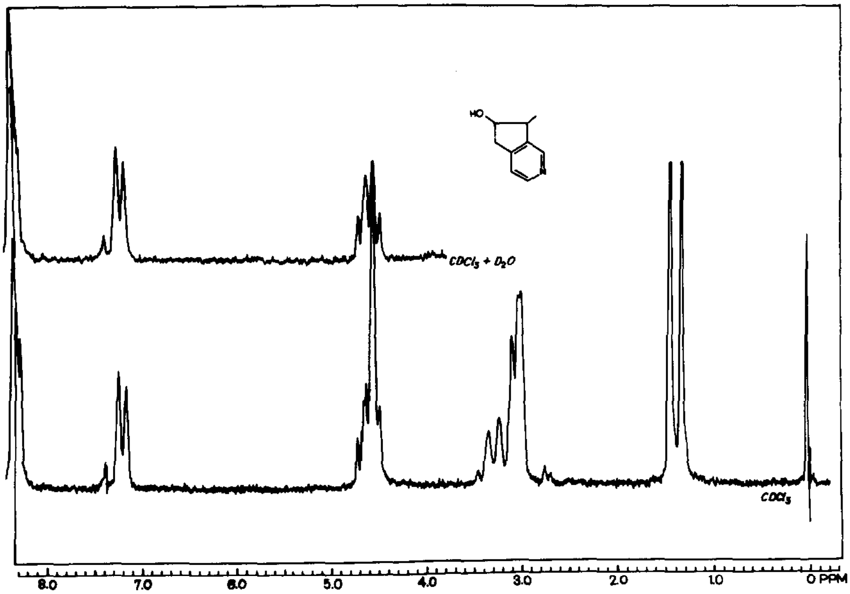
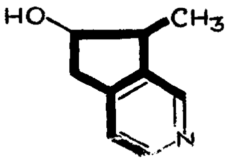


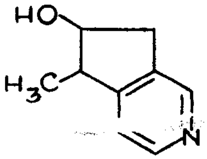
Fig. 1

The chemical shifts and splitting pattern[6] of the three aromatic protons [2α-protons around 8.30δ and 1β-proton doublet around 7.20δ (J = 5 c/s)] in the NMR spectrum of the alkaloid not only support this contention but further indicate that the pyridine nucleus is substituted at the 3,4 positions. The methyl group in the alkaloid appears as a doublet around 1.38δ (J = 7.5 c/s) which speaks of its attachment with a methine (multiplet around 3.07δ) benzylic in nature. Now, the fact that the benzylic region (2.70–3.45 δ) of the NMR spectrum of venoterpine integrates for altogether 3 protons suggests that in addition to the methine attached to the methyl group, the alkaloid contains two other benzylic protons. The $\overset{|}{\underset{|}{\mathrm{C}}}$HOH-group of the alkaloid shows a two proton signal around 4.60δ which quenches to a clean one-proton quartet at 4.68δ (J = 5 c/s) on deuterium exchange. This quartet obviously represents the methine proton of the $>\mathrm{C\underline{H}}$-OH which must have coupled with three equivalent benzylic protons.

The foregoing spectral evidence of venoterpine can be best accommodated in terms of the two alternative formulations I and II of which I is considered to be more plausible as it is consistent with its presumed isoprene precursor.



I



II

It is pertinent to mention in this connection that although the properties of venoterpine are quite similar to those of the alkaloid RW 47, the NMR spectrum of our alkaloid differs from that of RW 47 in the $\overset{|}{\underset{|}{\mathrm{C}}}$HOH region which leads us to believe that venoterpine is possibly a stereoisomer of the monoterpine alkaloid isolated by the Australian workers. Further work towards the exact stereochemical assignment of the hydroxyl group in venoterpine is underway.

Acknowledgment

The authors wish to express their heartiest thanks to Dr. Bhupesh C. Das, Gif-sur-Yvette (S. & O.), France for determination of the Mass no. of venoterpine and to Dr. A. Hofmann, Sandoz, Basle for the NMR spectra.

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