The Structure of a New Alkaloid, Daphmacrine. *X*-Ray Analysis of Daphmacrine Methiodide

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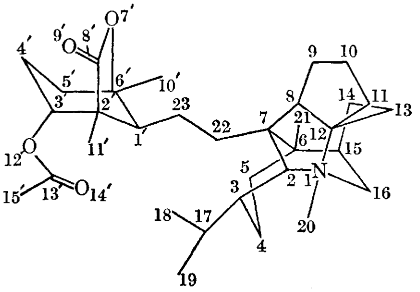
THE ISOLATION of eight new alkaloids from the bark of *Daphniphyllum macropodum* Miquel (Euphorbiaceae) has been reported, and the structures of six of them have been elucidated.[1]

The i.r., n.m.r., and mass spectral data of the remaining alkaloid, daphmacrine, $C_{32}H_{49}O_4N$ [hydrobromide, m.p. >300°, $[\alpha]_D + 30{\cdot}1°$ (c 1·79, MeOH)] suggested that it possesses a fundamental skeleton similar to daphniphyllamine,[1] but differs in the oxygen-containing portion. In the i.r. spectrum (KBr) it exhibited two carbonyl bands at 1770 and 1730 cm.$^{-1}$, which are ascribable to a five-membered lactone and an ester grouping respectively. The n.m.r. spectrum ($CDCl_3$, 60 Mc./sec.) showed the presence of one isopropyl (τ 9·01 and 8·83, d, J 6 c./sec.), three quaternary methyl (τ 8·87, 8·76, and 8·50, s), and one acetoxyl (τ 7·88, s) groups. The proton adjacent to the acetoxyl group appears at τ 5·11 (m, J_{AX+BX} 8 c./sec.). Furthermore, the mass spectrometric fragment peaks at *m/e* 286 and 272 are suggestive of daphniphyllamine and related alkaloids.[1]

Crystals of daphmacrine methiodide, from acetone–ether, $C_{32}H_{49}O_4N$, CH_3I, Me_2CO (*M* 711·8, m.p. 274—275°), are orthorhombic, $a = 14{\cdot}23$, $b = 24{\cdot}85$, $c = 10{\cdot}02$ Å, $Z = 4$, space group $P2_12_12_1$. The structure was determined with Mo-K_α scintillation counter data from three-dimensional Patterson and electron-density distributions, and refined by block-diagonal least-squares methods, the final *R* being 0·09 for 1834 observed reflections. A diagram of the molecule is shown in the Figure.

The crystal analysis has shown the compound to consist of two cage-structures which are linked by a flexible chain. The nitrogen-containing portion has the same structure as daphniphyllamine[1,2] in agreement with the spectral results. Bond lengths and angles are normal for this type of structure and are not listed here. The oxygen-containing portion consists of a six-membered ring in the chair form, bridged by carbon and oxygen atoms to form a five-membered lactone, with methyl groups substituted at each bridgehead. The C(6′)–C(1′)–C(2′) angle (97·5°) is smaller than the other angles in the six-membered ring (111·1—114·5, mean of five angles 112·9°), presumably due to the bridging. Other bond lengths and angles generally appear to be normal. The position of the acetoxyl group, not determinable from the spectral results, has been located as shown in the Figure, and the chain connecting the two cages contains two unsubstituted carbon atoms.



FIGURE

(*Received, March 27th, 1968; Com.* 384.)

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[1] N. Kamijo, T. Nakano, S. Terao, and K. Osaki, *Tetrahedron Letters*, 1966, 2889; T. Nakano and Y. Saeki, *ibid.*, 1967, 4791.

[2] N. Sakabe and Y. Hirata, *Tetrahedron Letters*, 1966, 965.