plexes will vary greatly depending on the ratio of iodine to iodide in the complex; moreover, it may be possible to determine this ratio quite unambiguously by the method of continuous variations, if a system can be found in which equilibrium exists.

AMES, IOWA

COMMUNICATIONS TO THE EDITOR

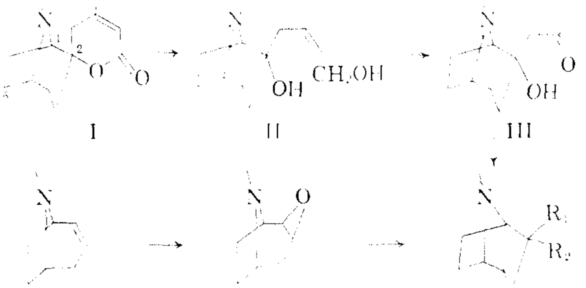
THE STRUCTURE OF DIOSCORINE

Sir:

Dioscorine, $C_{13}H_{19}O_2N$, a water-soluble alkaloid, has been isolated from *Dioscorea hirsuta* Blume[1,2] and *Dioscorea hispida* Dennst.[3,4] The early structural investigations[2] were continued by Pinder[3-9] who has proposed three structures, including I, for dioscorine. No facts have been presented from which the structure of the nitrogenous nucleus and the location of the lactone ring present in the alkaloid could be deduced conclusively. In this communication we wish to present findings which establish structure I for dioscorine.

Reduction of the alkaloid with lithium aluminum hydride gave a diol (II), m.p. 121° (picrate, m.p. 164–165°, lit.[8] 159–160°), which by ozonization was converted to glycolaldehyde and a hydroxyketone (III), m.p. 25°, infrared peaks at 3540 cm.$^{-1}$ (OH); 1705 cm.$^{-1}$ (C=O); 1405 cm.$^{-1}$ ($COCH_2$) and 1360 cm.$^{-1}$ ($COCH_3$) (picrate, m.p. 120–122°). On exposure to 0.1 N sodium hydroxide, III underwent retroaldol cleavage to acetone and a ketone (IV), infrared peak at 1723 cm.$^{-1}$ (CS_2), 1730 cm.$^{-1}$ (CCl_4); $[\alpha]^{25}D$ +17° (c 1.43 in H_2O) (di-p-toluoyl-D-tartrate, m.p. 149–151°). Treatment of IV with ethanedithiol and then desulfurization produced tropane (V), picrate, m.p. 280–288° (dec.); chloroplatinate, m.p. 208–210°, identical with authentic samples.[10] The ketone IV is therefore tropan-2-one or tropan-6-one. We initially preferred[11] the 6-substituted structure, mainly because of the position of the carbonyl band in the infrared of IV. Reduction with sodium borohydride or with hydrogen over Adams catalyst yielded an alcohol (VI), m.p. 70° (picrate, m.p. 262–263°; di-p-toluoyl-D-tartrate, m.p. 165–166°; di-p-toluoyl-L-tartrate, m.p. 164–165°) which had an infrared spectrum entirely different from that of a mixture of 6α- and 6β-hydroxytropane, m.p. 65–81° (*cf.* ref. 9) prepared by desulfurization of 6β-hydroxytropan-3-one thioketal. The three derivatives of the alcohol from dioscorine (I), however, were identical with those of 2α-hydroxytropane (VI).[12] Similarly the di-p-toluoyl-D-tartrates of IV from cocaine and dioscorine were identical. The nuclear magnetic resonance spectrum of dioscorine (in $CHCl_3$) has no peaks above 1200 c.p.s.[13] and unactivated methyls are therefore absent.

The configuration at C_2 then was determined: The saturated diol prepared by catalytic reduction of II had a pK_a of 8.81 (Cellosolve) like 2α-hydroxytropane (VI), pK_a 8.42, while 2β-hydroxytropane (VII) had pK_a 9.62. The observed differences in basicity are similar to those of quinine and epiquinine[14] and demonstrate that the tertiary hydroxyl in II has the α-configuration which is in agreement with the previously reported infrared evidence.[8] 2β-Hydroxytropane (VII), m.p. ∼−10°, $n^{20}D$ 1.4862 (picrate, m.p. 263–265°) was prepared by lithium aluminum hydride reduction of 2β,3β-epoxytropane (IX) (picrate, m.p. 248–254°) which in turn was available by oxidation of tropidine (VIII) with trifluoroperacetic acid in acetonitrile.[15] The conversion of both cocaine[12] and dioscorine to the same tropan-2-one (IV) demonstrates identical absolute configuration[16] in the two alkaloids.



IV, $R_1,R_2 = O$
V, $R_1 = H$, $R_2 = H$
VI, $R_1 = H$, $R_2 = OH$
VII, $R_1 = OH$, $R_2 = H$

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