

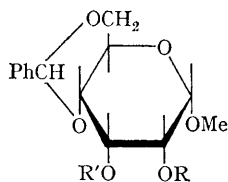
## A Synthesis of Javose (6-Deoxy-2-O-methyl-D-allose)

By J. S. BRIMACOMBE and A. HUSAIN

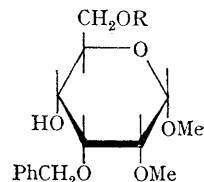
(Chemistry Department, The University, Birmingham 15)

JAVOSE, a new sugar component of two cardenolide glycosides found in the seeds of *Antiaris toxicaria* Lesch.,<sup>1,2</sup> has been assigned as 6-deoxy-2-O-methyl-D-allose (IX) on the basis of chemical<sup>1</sup> and other\* evidence. The following stereospecific synthesis of javose also confirms this assignment of structure.

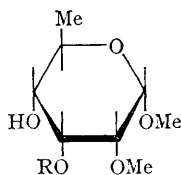
Treatment of methyl 4,6-O-benzylidene-2-O-toluene-*p*-sulphonyl- $\alpha$ -D-allopyranoside<sup>3</sup> (I) with benzyl bromide/sodium hydride in *NN*-dimethylformamide<sup>4</sup> gave the benzylated compound (II), m.p. 135°,  $[\alpha]_D^{23} + 7^\circ$  (*c*, 0.5 in  $\text{CHCl}_3$ ), which afforded methyl 3-O-benzyl-4,6-O-benzylidene- $\alpha$ -D-allopyranoside (III) {isolated as a crystalline hydrate, m.p. 58–60°,  $[\alpha]_D^{28} + 65^\circ$  (*c*, 0.5 in  $\text{CHCl}_3$ )} on heating with sodium methoxide in methanol.<sup>5</sup> Compound (III) gave a crystalline methyl ether (IV), m.p. 82–83°,  $[\alpha]_D^{28} + 24.5^\circ$  (*c*, 0.5 in  $\text{CHCl}_3$ ), when treated with methyl iodide/sodium hydride in *NN*-dimethylformamide,<sup>4</sup> which was smoothly converted into syrupy methyl 3-O-benzyl-2-O-methyl- $\alpha$ -D-allopyranoside (V),  $[\alpha]_D^{25} + 132 \pm 3^\circ$  (*c*, 2.25 in  $\text{CHCl}_3$ ), in hot 50% acetic acid. Monotoluene-*p*-sulphonylation and chromatography on silica gel yielded the sulphonate (VI),



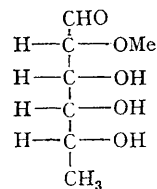
- (I)  $\text{R}=\text{SO}_2\cdot\text{C}_6\text{H}_4\cdot\text{Me}$ ;  $\text{R}'=\text{H}$   
 (II)  $\text{R}=\text{SO}_2\cdot\text{C}_6\text{H}_4\cdot\text{Me}$ ;  
 $\text{R}'=\text{CH}_2\text{Ph}$   
 (III)  $\text{R}=\text{H}$ ;  $\text{R}'=\text{CH}_2\text{Ph}$   
 (IV)  $\text{R}=\text{Me}$ ;  $\text{R}'=\text{CH}_2\text{Ph}$



- (V)  $\text{R}=\text{H}$   
 (VI)  $\text{R}=\text{SO}_2\cdot\text{C}_6\text{H}_4\cdot\text{Me}$



- (VII)  $\text{R}=\text{CH}_2\text{Ph}$   
 (VIII)  $\text{R}=\text{H}$



(IX)

\* We are informed by Prof. T. Reichstein that proof for this structure has been furnished by an independent synthesis.

$[\alpha]_D^{22} + 118 \pm 2^\circ$  (*c*, 0.6 in  $\text{CHCl}_3$ ), and subsequent desulphonyloxylation, with lithium aluminium hydride in benzene-ether,<sup>5</sup> gave methyl 3-*O*-benzyl-6-deoxy-2-*O*-methyl- $\alpha$ -D-allopyranoside (VII), b.p. 130—135° (bath)/0.5 mm.,  $[\alpha]_D^{22} + 110^\circ$  (*c*, 0.45 in  $\text{CHCl}_3$ ). Catalytic debenylation<sup>6</sup> of the latter compound afforded the glycoside (VIII),  $[\alpha]_D^{22} + 90 \pm 3^\circ$  (*c*, 1.55 in  $\text{CHCl}_3$ ), which gave 6-deoxy-2-*O*-methyl-D-allose (IX), m.p. 112—114°,  $[\alpha]_D^{20} - 54^\circ$  ( $\frac{1}{2}$  min.)  $\rightarrow -50^\circ$  (1 min.)  $\rightarrow -40^\circ$  (*final*, *c*, 1.6 in

$\text{H}_2\text{O}$ ), on hydrolysis with 1*N*-sulphuric acid at 95—100°.

Javose was initially isolated<sup>1</sup> in amorphous form but has since been crystallised.<sup>2</sup> A synthetic sample (kindly provided by Prof. Reichstein) had m.p. 107—110°,  $[\alpha]_D - 42.2 \pm 2^\circ$  (*final*, *c*, 1.3 in  $\text{H}_2\text{O}$ ), and was indistinguishable (infrared spectrum and chromatographically) from our preparation.

(Received, August 1st, 1966; Com. 565.)

<sup>1</sup> P. Mühlradt, E. Weiss, and T. Reichstein, *Annalen*, 1965, **685**, 253.

<sup>2</sup> T. Reichstein, personal communication.

<sup>3</sup> B. R. Baker and D. H. Buss, *J. Org. Chem.*, 1965, **30**, 2304.

<sup>4</sup> J. S. Brimacombe, B. D. Jones, M. Stacey, and J. J. Willard, *Carbohydrate Res.*, 1966, **2**, 167.

<sup>5</sup> R. S. Tipson, *Adv. Carbohydrate Chem.*, 1953, **8**, 107.

<sup>6</sup> R. Mozingo, *Org. Synth.*, 1946, **27**, 77.