Tetrahedron Letters No. 21, pp 1701-1702, 1975. Pergamon Press. Printed in Great Britain.

STEREOCHEMISTRY OF KANSUININE A

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(Received in Japan 15 March 1975; received UK for publication 11 April 1975)

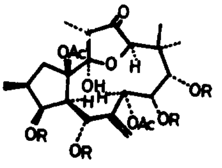
In the previous paper$^{1)}$, we reported the planar structure of kansuinine A, which is the multi-oxygenated diterpene polyester possessing analgesic and anti-writhing activities.

Now we wish to describe the stereochemistry of kansuinine A (1). A compound (2)$^{1)}$, which contains eleven carbon atoms of the parent alcohol was converted to a monoacetate (3), whose nmr spectrum gave the following stereochemical information. The three coupling constants, $J_{2,3}$, $J_{3,4}$, and $J_{4,5}$, are 3 Hz, suggested all cis-relationship$^{2)}$. Consequently, stereochemistry at C-7 and C-15 was necessarily determined as shown on steric grounds.

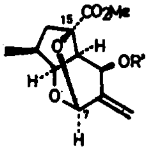
Furthermore, in compound (4) which was derived from kansuinine A by the transannular reaction, substituents attached at C-7, C-8, and C-9 in the six-membered ether ring were trans and cis each other from the consideration that two coupling constants, $J_{7,8}$ and $J_{8,9}$ are 11 Hz (trans diaxial relation) and 3.5 Hz (axial-equtorial relation), respectively$^{3)}$, and that compound (5)$^{1)}$ was reacted with one molar equivalent of sodium metaperiodate and gave a dicarbonate (6) with the action of N,N'-carbonyldiimidazole. In the NOE experiments of compound (4), summarized in Table 1, 10% increase of intensity of H-7 signal by irradiation of the H-4 signal shows protons at C-7, C-8, and C-9 to be α, β, and β configurations, respectively. Moreover, the observation of NOE between H-7 and H-11 suggested the stereochemistry for the structure of compound (4) except 18-CH_3 as shown in 4.

Now, NOE experiments of compound (7) (Table 2) disclosed the cis-relationship between H-11 and 14-OCH_3 and thus suggested the pictured stereostructure for this compound (7). 18-Methyl group is deduced to be situated in α-configuration by considering the following fact. In compound (8), $J_{11,12}$ and $J_{12,13}$ are 6 Hz and 4 Hz, respectively. Since the conformation of this compound was not clear, informations on the configurations at C-12 and C-13 were not obtained. The compound (7) was converted to an alcohol (9) [$C_{38}H_{50}O_{15}$: Mass 746 (m^+); NMR (δ, C_6D_6) 3.15 (1H, m, H-4), 3.72 (3H, s, $OC\underline{H}_3$), 3.75 (1H, H-11), 4.31 (1H, br.d, $J_{11,12}$= 3.7 Hz, H-12)] with sodium borohydride in ethanol at 0°. In the nmr spectrum of the alcohol (9), the signal assigned to the proton attached at C-12 appeared at δ 4.31 as a broad doublet. This results suggested that the relationship among protons at C-11, C-12, and C-13 are cis and trans[4)], respectively.

Consequently, we elucidated the stereochemistry of kansuinine A as depicted in 1.

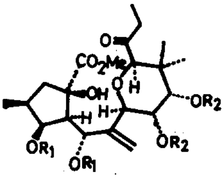


(1)



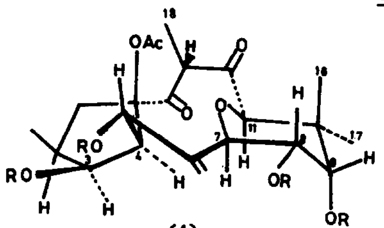
(2) R' = H

(3) R' = Ac



(5) $R_1 = R_2 = H$

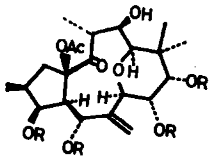
(6) $R_1, R_1 = \rangle CO$, $R_2, R_2 = \rangle CO$



(4)

Table 1

Irradiated	Observed	Increase
16-CH_3	H-9	13%
17-CH_3	H-9	13%
	H-11	14%
H-4	H-7	10%
H-11	H-7	10%
H-7	H-4	9%
	H-11	8%



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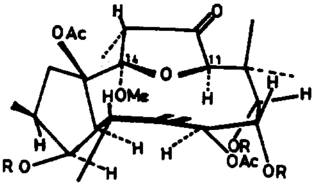
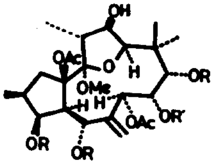


(7)

Table 2

Irradiated	Observed	Increase
OCH_3	H-11	19%
H-4	H-3	9%
	H-7	16%



(9)

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