Crystal and Molecular Structure of the Free Acid Form of Antibiotic X-206 Hydrate

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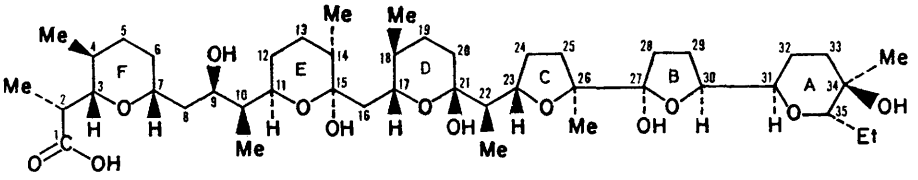
Summary A crystal structure analysis of the free acid form of the antibiotic X-206 has resulted in corrections to the previously published structure which was based on an *X*-ray analysis of its silver salt.

IN an earlier communication[1], the structure of antibiotic X-206 was proposed to be (I) based on the *X*-ray crystallographic analysis of the silver salt of the antibiotic. In order to compare the conformation of antibiotic X-206 in the free acid form[2] with that of the salt, a crystal structure analysis of the antibiotic hydrate was undertaken. The results of this analysis indicate the *correct* structure of antibiotic X-206 to be (II).

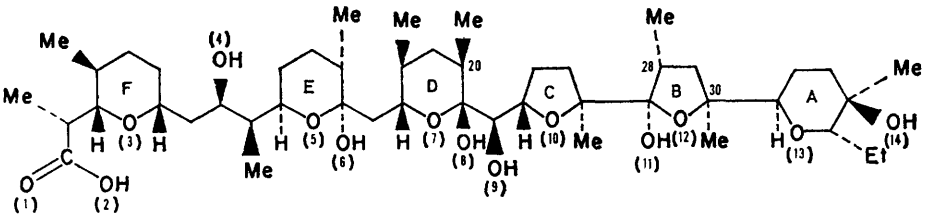
The differences between (II) and (I) are the addition of three methyl groups to (I) at C(20), C(28), and C(30) and the replacement of the methyl at C(22) in (I) by a secondary hydroxy-group [OH(9) in (II)].

The correct structure (II) for antibiotic X-206 was established from a three-dimensional *X*-ray diffraction analysis of the monohydrate ($C_{47}H_{82}O_{14}\cdot H_2O$),† m.p. 133—145°, p$K_a$ 8·1 (70% dimethylformamide). *Crystal data:* orthorhombic, space group $P2_12_12_1$, $a = 12{\cdot}465$, $b = 16{\cdot}402$, $c = 25{\cdot}122$ Å, $D_m = 1{\cdot}14$, $D_c = 1{\cdot}149$ g cm^{-3} for $Z = 4$. The structure was solved by a multiple solution procedure[3] and refined by block-diagonal least-squares. The final discrepancy index is $R = 0{\cdot}043$ for 3420 observed reflexions (heavier atoms anisotropic, hydrogens isotropic).

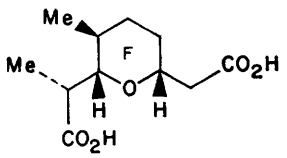
In the original analysis of the silver salt, three methyl carbon atoms were not found and one hydroxy-oxygen was incorrectly identified as a methyl carbon. An examination of the final difference Fourier from the previous analysis showed that the missing atoms were indeed present, but that their peak heights (*ca.* 1·2 e Å^{-3}) were of the same magnitude as some noise peaks. At that time these peaks were not considered significant. The final *R* value for the silver salt with the corrected structure is 0·083 for 1392 observed reflections (silver anisotropic, all other atoms isotropic, hydrogens included in structure factor calculations but not refined). The density calculated for $C_{47}H_{81}AgO_{14}$, $D_c = 1{\cdot}230$ g cm^{-3}, is in good agreement with $D_m = 1{\cdot}24$ previously reported for the silver salt.[1]



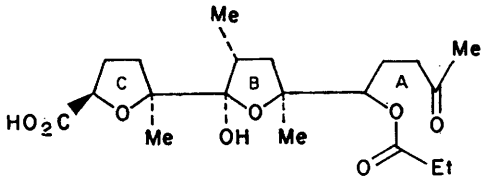
(I)



(II)



(III)



(IV)

As reported earlier,[1] Jones oxidation of (II) gave *inter alia*, a dicarboxylic acid (III) derived from ring F of the antibiotic and a second acid with corrected structure (IV) derived from rings A, B, and C of (II). The molecular formula ($C_{21}H_{34}O_8$), and mass spectral fragmentation of the methyl ester of (IV) reported earlier[1] are consistent with the corrected structure.

A paper comparing the free acid form and the silver salt of X-206 is in preparation.

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† Corrected in this paper from the formula $C_{45}H_{78}O_{13}\cdot H_2O$ proposed in ref. 1.

[1] J. F. Blount and J. W. Westley, *Chem. Comm.*, 1971, 927.
[2] J. Berger, A. I. Rachlin, W. E. Scott, L. H. Sternbach, and M. W. Goldberg, *J. Amer. Chem. Soc.*, 1951, 73, 5295.
[3] G. Germain, P. Main, and M. M. Woolfson, *Acta Cryst.*, 1970, **B26**, 274.