The Structure of Aristeromycin

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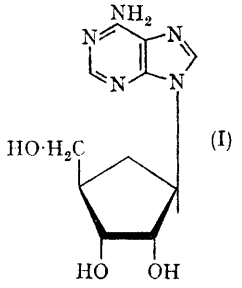
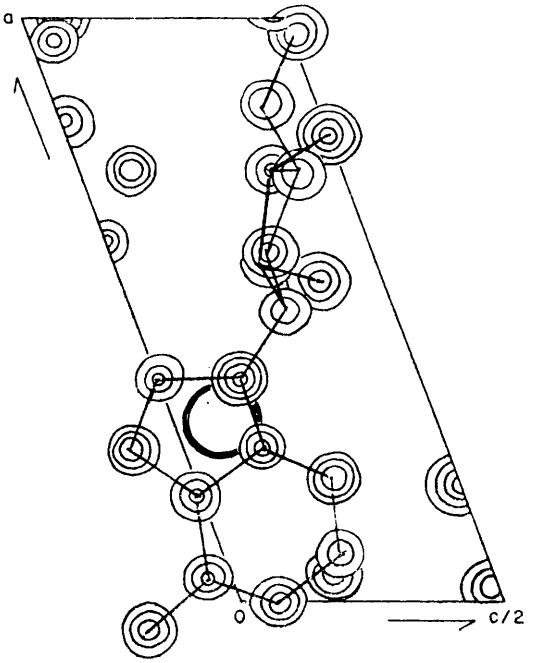
ARISTEROMYCIN, a new antibiotic isolated[1] from the culture of *Streptomyces citricolor*, exhibits inhibition of the growth of *Piricularia oryzae*, and *Xanthomonas oryzae*, which are phytopathogenic organisms of rice plants,[1] and of plants.[2]



(I)

Aristeromycin, $C_{11}H_{15}N_5O_3$, colourless prisms, m.p. 213—215° $[\alpha]_D$ −52·5°, displays ultraviolet [λ_{max} (H_2O) 262 mμ, log ϵ 4·167] and infrared spectra closely related to that of adenosine and angstmycin C. The n.m.r. spectra show the presence of two aromatic hydrogens at 8·17 and 8·10 p.p.m. as singlets (each 1H) and an amino-group at 7·2 p.p.m. (2H) which disappears on addition of D_2O. These data suggest that aristeromycin is an adenosine derivative. The remainder of the molecule, $C_6H_{11}O_3$, has a *cis*-diol, a hydroxyl, and a methylene group. Aristeromycin gave the penta-acetate and was refractory toward refluxing with dilute sulphuric acid suggesting that the compound has no usual *N*-glycosidic linkage.



The n.m.r. spectra of aristeromycin and its penta-acetate show two methines (RO-C*H*-), (where R = H or Ac), one each of methine (N-C*H*-), methine $\left(\begin{matrix}C\\ C\end{matrix}\!\!>\!CH\text{-}C\right)$, methylene (-C$H_2$-), and methylene (C$H_2$OR) (where R = H or Ac) hydrogens.

Thus, the structure of aristeromycin, apart from stereochemistry, was assumed as (I) on the basis of these findings and the result of spin-decoupling studies in n.m.r. spectroscopy. For the confirmation of the suggested structure and the determination of the absolute configuration, *X*-ray analysis with minimum function and least-squares methods was carried out. Aristeromycin was obtained as the hydrobromide in colourless monoclinic prisms, m.p. 229° (decomp.), $C_{11}H_{15}N_5O_3$,HBr. The space group of the crystal was decided as $P2_1$. The stereochemical structure thus obtained was in complete accord with (I). Finally, the absolute structure was established as (1′*R*, 2′*S*, 3′*R*,4′*R*)-9-[β-2′α,3′α-dihydroxy-4′β-(hydroxymethyl)cyclopentyl]adenine[3] by the use of anomalous dispersion of bromine atom in the crystal.

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[1] T. Kusaka, H. Yamamoto, M. Shibata, M. Muroi, T. Kishi, and K. Mizuno, *J. Antibiotics, Ser. A.*, 1967, in the press.

[2] Unpublished data.

[3] Y. F. Shealy and J. D. Clayton, (*J. Amer. Chem. Soc.*, 1966, **88**, 3885) have synthesized 9-[β-D,L-2α,3α-dihydroxy-4β-(hydroxymethyl)cyclopentyl]adenine, m.p. 238—242° (decomp.), λ_{max} in mμ ($\epsilon \times 10^{-3}$): 261 (14·8) in phosphate buffer (pH 7).