## Antibiotic 1233A: a Fungal \( \beta\)-Lactone

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Summary Antibiotic 1233A is shown to be 12-hydroxy-13-hydroxymethyl-3,5,7-trimethyltetradeca-2,4-diene-dioic acid 12,14-lactone (1).

When grown on Czapek–Dox medium the unidentified fungus ACC 1233, believed to be a *Cephalosporium* sp., produces an antibiotic carboxylic acid, 1233A, for which we suggest the structure (1). This is the first report of the isolation of a  $\beta$ -lactone from a fungus, and we have been unable to find any record of the isolation of a  $\beta$ -lactone from other natural sources.

The n.m.r. and u.v. spectra of 1233A,  $C_{18}H_{28}O_5$ , suggest the presence of the system  $C(Me) = CH \cdot C(Me) = CH \cdot CO_2H$ , and this part-structure was confirmed by hydrogenation of

1233A to a tetrahydro-derivative with the expected properties and by ozonolysis of 1233A to the methyl ketone (2) and pyruvaldehyde. The n.m.r. spectrum also shows

the presence of the system HOCH<sub>2</sub>CH·CH·CH<sub>2</sub>. The chemical shifts of 12-H and 13-H ( $\tau$  5·5 and 6·7 respectively) are consistent with their being attached to a  $\beta$ -lactone, whose presence was suggested by a band at about 1820 cm<sup>-1</sup> in the i.r. spectrum of 1233A and its derivatives ( $\beta$ -propiolactone gives a band at 1820 cm<sup>-1</sup> and its methylene groups give signals at  $\tau$  5·7 and 6·4). The presence of a  $\beta$ -lactone was confirmed by hydrolysis of 1233A to a hydroxy-acid which no longer shows the 1820 cm<sup>-1</sup> absorption and in which 12-H and 13-H give signals at  $\tau$  6·2 and 7·4 respectively.

The hydroxymethyl  $\beta$ -lactone and dienoic acid systems account for all the unsaturation and oxygen of 1233A and since the only other methyl group detectable in 1233A is secondary, must occupy the ends of a straight chain. We assign the secondary methyl group to C-7 since the n.m.r. spectrum of the ketone (2) shows the  $\alpha$ -methylene group to be part of an ABX system; this assignment is supported by the mass spectra of the ketone (2) and other derivatives of 1233A.

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