A SYNTHESIS OF CHROMOSE D AND AN IMPROVED SYNTHESIS OF CHROMOSE A

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Chromomycin is the name given\(^1\) to a group of cancerostatic and anticancer antibiotics produced by \textit{Streptomyces griseus} No. 7, and is a mixture of several closely-related compounds. The principal antibiotic\(^2\) of this group, chromomycin A\(_8\), on hydrolysis with hot 50\% acetic acid yields the aglycone, chromomycinone, and a water-soluble fraction from which four sugars have been isolated\(^3\) and characterised\(^4\) by n.m.r. and chemical evidence as 2,6-dideoxy-4-\textit{O}-methyl-\textit{d}-lyxo-hexose, 4-\textit{O}-acetyl-2,6-dideoxy-3-\textit{C}-methyl-\textit{l}-arabino-hexose, 2,6-dideoxy-\textit{d}-arabino-hexose, and 3-\textit{O}-acetyl-2,6-dideoxy-\textit{d}-lyxo-hexose. These compounds have been designated\(^3\) as chromose A, B, C, and D, respectively, and identical or closely related sugars have also been identified\(^6\) as methanolysis products of olivomycin\(^7\), the principal antibiotic from \textit{Streptomyces olivoreticuli}. The isolation of similar antibiotics has been reported\(^8\). The structure of chromose A has been established\(^9\) by synthesis,

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\text{(I)}
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\text{(II)} \quad R = H
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\text{(III)} \quad R = \\text{Ts}
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\text{(IV)} \quad R = R' = H
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\text{(V)} \quad R = \text{Ac, } R' = H
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\text{(VI)} \quad R = H, R' = \text{Ac}
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\text{(VII)} \quad R = \text{Ac, } R' = \text{Me}
\]

\[
\text{(VIII)} \quad R = \text{CH}_{2}\text{Ph, } R' = H
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and we now report a synthesis of chromose D which confirms its structure as 3-\textit{O}-acetyl-2,6-dideoxy-\textit{d}-lyxo-hexose (I).

Monotoluene-\textit{p}-sulphonylation of methyl 2-deoxy-\textit{\alpha}-\textit{d}-lyxo-hexopyranoside\(^10\) (II) gave principally the 6-\textit{O}-toluene-\textit{p}-sulphonate (III) which, on reduction

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with lithium aluminium hydride, was smoothly converted into methyl 2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (IV). The latter glycoside is of interest since one of the enantiomorphic forms of the free sugar has been identified\(^{11}\) by chromatography as a constituent of the cardiac glycoside from *Pentopetia androsaemifolia*. On treatment in pyridine with 1.2 mol. of acetic anhydride, compound (IV) gave, *inter alia*, a mixture of two monoacetates which had significantly different mobilities on thin-layer chromatography. The major component of the mixture was separated by chromatography on silica gel and identified as methyl 3-O-acetyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (V), since, on careful methylation, it gave a product indistinguishable (by thin-layer chromatography) from methyl 3-O-acetyl-2,6-dideoxy-4-O-methyl-\(\alpha\)-D-lyxo-hexopyranoside (VII). The latter compound was obtained by acetylation of methyl 2,6-dideoxy-4-O-methyl-\(\alpha\)-D-lyxo-hexopyranoside\(^{9}\) (methyl \(\alpha\)-D-chromoside A). Attempts to ascertain the probable conformation of glycoside (IV) in pyridine solution by n.m.r. spectroscopy were unsuccessful since no clear-cut signal arose from the anomeric proton. However, conformation (IVA) should be adopted by the glycoside, since it has equatorial substituents at positions 3 and 5 and the glycosidic substituent in the preferred axial position\(^{12}\). This being so, then preferential acetylation at the C-3 hydroxyl group is to be expected.

Since the assignment of structure to monoacetate (V) was not based on crystalline derivatives, efforts were made to prepare both monoacetates using the ortho-ester exchange method described by Reese and Sulston\(^{13}\) for the monoacylation of nucleoside cis-2,3-diol systems. Treatment of glycoside (IV) with trimethyl orthoacetate in the presence of an acid catalyst, followed by decomposition of the resultant 3,4-\(O\)-methoxyethylidene derivative, gave a mixture of the 3-\(O\)- and 4-\(O\)-acetates in the approximate ratio 1:2 (estimated by chromatography). Methyl 4-\(O\)-acetyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (VI) was isolated in crystalline form by chromatography on silica gel, and its structure may be confidently assigned since it was identical with the product obtained by acetylation and catalytic debenzylation\(^{14}\) of methyl 3-\(O\)-benzyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside\(^{9}\) (VIII). Migration of the acetate group under the neutral conditions used to remove the benzyl group is unlikely, and both monoacetates (V) and (VI) were unaffected by similar treatment.

Support for the above structural assignments was also sought by n.m.r. spectroscopy. It is known\(^{15,16}\) that the signal for an axial acetoxyl-group attached to the pyranoid ring occurs at lower field than that for the equatorial group. The n.m.r. spectrum* of the 3-\(O\)-acetate (V) showed characteristic signals at 5.15 (triplet, \(J = 3\) c.p.s., equatorial anomeric-proton), 6.61 (OMe), 7.86 (OAc), and 8.68 (doublet, \(J = 6\) c.p.s., sec-Me) and the spectrum of the 4-\(O\)-acetate (VI), signals at 5.14 (triplet, \(J = 3\) c.p.s., equatorial anomeric-proton), 6.62 (OMe), 7.77 (OAc), and 8.78 (doublet, \(J = 6\) c.p.s., sec-Me). Thus, the appearance of the signal from the acetoxyl group in

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*Determined in chloroform with tetramethylsilane as external reference using a Varian A60 spectrometer. Absorptions are given on the \(\tau\) scale.

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the former compound at higher field is consistent with its equatorial location and is in agreement with the structure assigned by chemical means.

Hydrolysis of compound (V) with hot 50 % acetic acid gave 3-O-acetyl-2,6-dideoxy-D-lyxo-hexose (I) {m.p. 115–116.5°, [α]$_D$ +100 (1 min) → +78° (final, c 1, water)} which was identical with natural chromose D, which has m.p. 118°, not 128° as reported previously. Although acyl migrations have for most part been studied under alkaline conditions, migrations under acidic conditions are not uncommon and presumably take place via an ortho-ester. The absence of any significant acyl migration under the hydrolytic conditions used was demonstrated when the 3-O- and 4-O-acetates, (V) and (VI), respectively, gave readily distinguishable products on hydrolysis.

During the course of this work, the need for quantities of chromose A (2,6-dideoxy-4-O-methyl-D-lyxo-hexose) and its methyl glycoside prompted the development of a more convenient synthesis. Since the 6-O-toluene-p-sulphonate (III) should adopt the C1 conformation, with equatorial substituents at positions 3 and 5 and the glycosidic substituent in the preferred axial position, further toluene-p-sulphonylation should lead to selective reaction at the C-3 hydroxyl group. With two mol. of toluene-p-sulphonyl chloride, methyl 2-deoxy-α-D-lyxo-hexopyranoside (II) gave mainly a single dis-O-toluene-p-sulphonate, together with a little tri-ester. The di-ester was identified as methyl 2-deoxy-3,6-di-O-toluene-p-sulphonyl-α-D-lyxo-hexopyranoside since, on methylation and treatment with lithium aluminium hydride, it was smoothly converted into methyl 2,6-dideoxy-4-O-methyl-α-D-lyxo-hexopyranoside which was identical with methyl α-D-chromoside A derived from the naturally-occurring and synthetic reducing sugar. Chromose A was obtained from the glycoside by acidic hydrolysis, and the overall yield was better than that obtained by the previously described route.

EXPERIMENTAL

Thin-layer chromatography was performed on silica gel (Merck) using ethyl acetate, unless otherwise indicated. Detection was effected with an acidified 3 % (w/v) solution of vanillin in ethanol at 115° for 5–10 min. Solvents were usually removed under reduced pressure below 40°.

Methyl 2-deoxy-6-O-toluene-p-sulphonyl-α-D-lyxo-hexopyranoside (III).

A cooled solution of toluene-p-sulphonyl chloride (12.8 g, 1.1 mol.) in dry pyridine (20 ml) was added to a cooled (−10°) solution of methyl 2-deoxy-α-D-lyxo-hexopyranoside (10 g) in dry pyridine (100 ml) and the mixture was set aside at room temperature for 48 h. Water (4 ml) was added and the solvents were removed to give a brown residue which was taken up in chloroform (150 ml). This solution was washed with dilute aqueous solutions of sodium hydrogen sulphite (2 × 50 ml) and sodium hydrogen carbonate (2 × 50 ml), water (50 ml), saturated aqueous cadmium chloride (50 ml), and water (2 × 50 ml), and dried (MgSO$_4$). Evaporation of the
filtered solution gave the product (III) (18.2 g), \([\alpha]_D^{24} + 82.5^\circ\) (c 7.3, chloroform), as an amorphous solid which was substantially homogeneous on thin-layer chromatograms; the main impurity appeared to be a di-ester compound. The infrared spectrum showed \(v_{\max}\) at 3400–3600 (OH), 1180 and 1270 cm\(^{-1}\) (sulphonate ester).

**Methyl 2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (IV)**

A boiling solution of the foregoing sulphonate (18 g) in benzene–ether (600 ml, 1:2 v/v) was treated with lithium aluminium hydride (2 g) for 4 h, and after addition of a further quantity of hydride (2 g) heating was continued for 14 h. On cooling, ethyl acetate and water were added and insoluble material was collected and washed with ether. The combined filtrate and washings were extracted with water (4 x 100 ml) and the aqueous solution was freeze-dried to give a syrupy residue (4.1 g). Distillation of a sample (0.5 g) of the syrup gave the product (IV) (0.3 g), b.p. 100–110\(^\circ\) (bath)/0.05 mm, which crystallised on cooling, and on recrystallisation from benzene–light petroleum (b.p. 80–100\(^\circ\)) had m.p. 70–72\(^\circ\), \([\alpha]_D^{15} + 122^\circ\) (c 2, chloroform). (Found: C, 51.6; H, 8.5. \(C_9H_{14}O_4\) calc.: C, 51.8; H, 8.7%). Additional quantities of the product were readily obtained by seeding the original syrup.

**Methyl 3-O-acetyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (V)**

To a cooled (\(-10^\circ\)) solution of the foregoing glycoside (2 g) in dry pyridine (8 ml) was slowly added a cooled solution of acetic anhydride (1.48 g, 1.2 mol.) in dry pyridine (4 ml), and the mixture was set aside at room temperature for 12 h. After the addition of a few drops of water, the solvent was removed, the residue was taken up in chloroform (50 ml), and the organic layer was washed with dilute aqueous sodium hydrogen carbonate (2 x 20 ml), water (20 ml), saturated aqueous cadmium chloride (2 x 20 ml), and water (20 ml), and dried (MgSO\(_4\)). Evaporation of the filtered solution afforded a syrup (2.1 g) which, on examination by thin-layer chromatography, showed three components, with \(R_F\) 0.53 (4-O-acetate), 0.59 (3-O-acetate, major), and 0.75 (di-O-acetate). The syrup was dissolved in dry benzene (10 ml) and chromatographed on silica gel (65 g, 40 x 2 cm, Davison grade 950, 60–200 mesh) by elution with benzene (160 ml), benzene–ether (620 ml, 4:1 v/v), benzene–ether (620 ml, 2:1 v/v), and ether (100 ml). Fractions (40 ml) were collected and examined by thin-layer chromatography. Fractions 7–11 contained the di-O-acetate, 15–31 the 3-O-acetate, whilst later fractions contained a mixture of both monoacetates. Evaporation of fractions 15–31 gave the syrupy product (V) (0.74 g), \([\alpha]_D^{18} + 142^\circ\) (c 2.4, chloroform), which could not be induced to crystallise.

**Methylation studies**

(a) *Using methyl iodide and sodium hydride*\(^{24}\)

A solution of the foregoing acetate (10 mg) in dry tetrahydrofuran (0.4 ml) was treated with redistilled methyl iodide (0.05 ml) and sodium hydride powder (30 mg), and the mixture was set aside at room temperature for 3 h. Examination of the mixture by thin-layer chromatography [using ethyl acetate–chloroform (1:1 v/v)] revealed components with \(R_F\) 0.5 (starting material), 0.65, 0.75 (trace, unidentified),
and 0.82 (major). The chromatographic properties of the components at $R_F$ 0.65 and 0.82 were indistinguishable from those of methyl 2,6-dideoxy-3,4-di-$O$-methyl-$\alpha$-D-lyxo-hexopyranoside and methyl 3-0-acetyl-2,6-dideoxy-4-$O$-methyl-$\alpha$-D-lyxo-hexopyranoside (see below), respectively. The presence of the component at $R_F$ 0.65 indicates that some saponification of the ester occurred during methylation.

(b) Using diazomethane
To a solution of the 3-0-acetate (V) (15 mg) and boron trifluoride etherate (40 mg) in dry ether (0.2 ml) was added a 5 % solution of diazomethane in dry ether (0.1 ml), and the mixture was set aside at room temperature for 2 h. The excess of reagent was destroyed with 50 % aqueous acetic acid and the solution taken up in chloroform (5 ml) which was then washed with water and dried (MgSO$_4$). Examination of the concentrated extract by thin-layer chromatography [ethyl acetate–chloroform (1:1 v/v)] showed, in addition to starting material, a component with $R_F$ 0.82 (cf. methyl 3-0-acetyl-2,6-dideoxy-4-$O$-methyl-$\alpha$-D-lyxo-hexopyranoside).

A sample of methyl 3-0-acetyl-2,6-dideoxy-4-$O$-methyl-$\alpha$-D-lyxo-hexopyranoside (VII), $[\alpha]_D^{15}$ +104° ($c$ 2.6, chloroform), was prepared by acetylation of methyl 2,6-dideoxy-4-$O$-methyl-$\alpha$-D-lyxo-hexopyranoside$^9$ (methyl $\alpha$-D-chromoside A) in the usual manner. Methyl 2,6-dideoxy-3,4-di-$O$-methyl-$\alpha$-D-lyxo-hexopyranoside was prepared from compound (IV) using methyl iodide and sodium hydride$^{24}$ by the procedure described above.

_Methyl 4-$O$-acetyl-2,6-dideoxy-$\alpha$-D-lyxo-hexopyranoside (VI)

(a) By orthoester exchange$^{13}$
To a stirred solution of methyl 2,6-dideoxy-$\alpha$-D-lyxo-hexopyranoside (0.58 g) in trimethyl orthoacetate (2.2 ml, dried by distillation from calcium hydride) was added mesitylenesulphonic acid (0.36 g) and, after 2 h, the theoretical amount of solid sodium hydrogen carbonate to neutralise the acid. The solution was dispersed in chloroform (30 ml) which was then washed with water (2 x 10 ml) and dried (MgSO$_4$). Concentration of the filtered solution gave a brown syrup (ca. 0.7 g) which, on thin-layer chromatography, showed two principal components, with $R_F$ 0.53 (4-$O$-acetate, major) and 0.59 (3-$O$-acetate). The above procedure differs slightly from that described by Reese and Sulston$^{13}$ and decomposition of the 3,4-$O$-methoxyethylidene compound occurred during work-up due, probably, to the development of slightly acidic conditions. The syrup was dissolved in benzene (3 ml) and chromatographed on silica gel (15 g), as described previously; 10 ml fractions were collected. Fractions 13–19 contained a mixture of both components, fractions 20–24 contained the product (VI) together with traces of the 3-$O$-acetate. The latter fractions were combined and evaporated to a syrup (0.14 g) which crystallised on seeding (see below) and, on recrystallisation from benzene–light petroleum (b.p. 80–100°), had m.p. 87–90° $[\alpha]_D^{18}$ $+158^\circ$ ($c$ 0.95, chloroform) (Found: C, 52.8; H, 7.8. C$_9$H$_{16}$O$_5$ calc.: C, 52.9; H, 7.9 %).

(b) From methyl 3-$O$-benzyl-2,6-dideoxy-$\alpha$-D-lyxo-hexopyranoside (VIII)
To a cooled (0°) solution of methyl 3-$O$-benzyl-2,6-dideoxy-$\alpha$-D-lyxo-hexo-
pyranoside\(^9\) (0.86 g) in dry pyridine (4 ml) was added acetic anhydride (0.8 ml), and the solution was set aside at room temperature for 24 h. After the addition of water (2 ml), the solvents were removed, the solid residue was dissolved in chloroform (20 ml), and the solution was washed with dilute aqueous sodium hydrogen carbonate (2 × 10 ml), water (10 ml), saturated aqueous cadmium chloride (20 ml), and water (2 × 10 ml), and dried (Mg SO\(_4\)). The filtered solution was evaporated to a solid residue which was recrystallised (twice) from light petroleum (b.p. 80–100\(^\circ\)) to give methyl 4-O-acetyl-3-O-benzyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (0.4 g), m.p. 87–92\(^\circ\), \([\alpha]_D^{15} + 178^\circ\) (c 1, chloroform) (Found: C, 65.2; H, 7.4. C\(_{16}\)H\(_{22}\)O\(_5\) calc.: C, 65.3; H, 7.5%).

A solution of the foregoing compound (0.2 g) in ethanol (80 ml) containing palladium charcoal\(^{14}\) (0.1 g) was shaken for 20 h at room temperature in the presence of hydrogen at a slight overpressure. The catalyst was removed and the filtrate evaporated under reduced pressure to a crystalline residue (0.14 g) which, on recrystallisation from benzene–light petroleum (b.p. 80–100\(^\circ\)), gave pure methyl 4-O-acetyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (0.1 g), m.p. 90–91\(^\circ\), \([\alpha]_D^{16} + 165^\circ\) (c 1, chloroform) (Found: C, 53.1; H, 7.8. C\(_8\)H\(_{16}\)O\(_5\) calc.: C, 52.9; H, 7.9%). The infrared spectrum and thin-layer chromatographic properties of this compound were indistinguishable from those of the monoacetate prepared by orthoester exchange.

3-O-Acetyl-2,6-dideoxy-D-lyxo-hexose (I)

A solution of compound (V) (0.5 g) was hydrolysed with 50\% acetic acid (50 ml) for 20 min at 85–90\(^\circ\). Examination of the hydrolysate by thin-layer chromatography revealed the principal component with \(R_F\) 0.40 and a trace of a second component, \(R_F\) 0.28. The hydrolysate was neutralised (Ag\(_2\)CO\(_3\)) and filtered, insoluble material was washed with acetone, and the combined filtrate and washings were evaporated. The resultant syrup was decolourised in methanol with activated charcoal and the solution was concentrated to a syrup (0.48 g) which crystallised on addition of ethyl acetate. The crude product was dissolved in ethyl acetate (5 ml), and the solution was filtered to remove insoluble material, concentrated to ca. 1 ml, and allowed to crystallise. Two recrystallisations from ethyl acetate gave the product (I) (0.3 g), m.p. 115–116.5\(^\circ\), \([\alpha]_D^{28} + 100\) (1 min)\(\rightarrow\) +78\(^\circ\) (final, c 1, water); the direction of mutarotation is indicative of the \(\alpha\)-configuration (Found: C, 50.2; H, 7.5. C\(_8\)H\(_{14}\)O\(_5\) calc.: C, 50.5; H, 7.4%). No depression of m.p. was observed on admixture with natural chromose D, and the thin-layer chromatographic properties, infrared spectra (Nujol mulls), and X-ray powder photographs of the synthetic and natural sugars were indistinguishable.

Under identical conditions of hydrolysis, methyl 4-O-acetyl-2,6-dideoxy-\(\alpha\)-D-lyxo-hexopyranoside (VI) was shown by thin-layer chromatography to give mainly a component with \(R_F\) 0.28 and a trace of a second component with \(R_F\) 0.40. Isolation by the method described above gave a syrup which could not be induced to crystallise. Its infrared spectrum differed significantly from that of natural and synthetic chromose D.

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Methyl 2-deoxy-3,6-di-O-toluene-p-sulphonyl-α-D-lyxo-hexopyranoside

To a cooled (−10°C) and stirred solution of methyl 2-deoxy-α-D-lyxo-hexopyranoside10 (2 g) in dry pyridine (18 ml) was slowly added a cooled solution of toluene-p-sulphonyl chloride (4.72 g, 2.2 mol.) in dry pyridine (5 ml), and the mixture was set aside at room temperature for 4 days. After the addition of water (1 ml), the solvent was removed and the residue was taken up in chloroform (100 ml) which was washed with dilute aqueous solutions of sodium hydrogen sulphite (2 x 50 ml) and sodium hydrogen carbonate (50 ml), and water (50 ml). The chloroform extract was freed from pyridine by shaking with a concentrated aqueous solution of cadmium chloride (50 ml), then washed with water (2 x 100 ml) and dried (MgSO4). Removal of the solvent gave an amorphous residue (5.4 g), [α]D24 +75° (c 2, chloroform), which was shown by thin-layer chromatography (using benzene-methanol, 97:3) to contain predominantly methyl 2-deoxy-3,6-di-O-toluene-p-sulphonyl-α-D-lyxo-hexopyranoside, admixed with a little methyl 2-deoxy-3,4,6-tri-O-toluene-p-sulphonyl-α-D-lyxo-hexopyranoside25 (m.p. 147-148°).

Methyl 2-deoxy-4-O-methyl-3,6-di-O-toluene-p-sulphonyl-α-D-lyxo-hexopyranoside

To a solution of the foregoing di-ester (5 g) in redistilled methyl iodide (100 ml) was added freshly prepared silver oxide (4 g), and the mixture was heated under reflux for 14 h, with addition of more silver oxide (3 g) after 2 and 4 h. The cooled solution was filtered and the filtrate concentrated to a syrup (4.5 g) which was shown by thin-layer chromatography to be essentially homogeneous. The infrared spectrum of the syrup showed the absence of bands at 3400-3600 cm⁻¹ due to hydroxyl absorption. A portion (0.5 g) of the syrup crystallised on storage with a small quantity of methanol. Two recrystallisations from dry methanol gave the product (0.35 g), m.p. 110-111° (dec.), [α]D21 +135° (c 1, chloroform) (Found: C, 57.1; H, 5.95. C26H28O9S2 calc.: C, 52.8; H, 5.6%).

Methyl 2,6-dideoxy-4-O-methyl-α-D-lyxo-hexopyranoside

A solution of the syrupy product (4 g) from the previous experiment in dry benzene-ether (500 ml, 1:1 v/v) was refluxed in the presence of lithium aluminium hydride (3 g) for 48 h. Ethyl acetate and water were added to the cooled mixture to destroy the excess of reagent, insoluble material was collected and washed thoroughly with ether, and the combined filtrate and washings were extracted with water (4 x 100 ml). The aqueous layer was then continuously extracted with ether for 48 h and the dried (MgSO4) extract was concentrated to a colourless syrup (0.65 g), which rapidly crystallised. Two recrystallisations from n-hexane afforded the product (0.35 g), m.p. 95-96°, [α]D20 +164° (c 1, chloroform). Miyamoto et al.4 report m.p. 92°, [α]D25 +122° (c 1, ethanol) for methyl α-D-chromoside A and Berlin et al.7 give m.p. 98°, [α]D26 +150° (c 0.4, ethanol) for methyl α-D-olivomoside A. The infrared spectrum and thin-layer chromatographic properties of the product were indistinguishable from those of natural4 and synthetic9 methyl α-D-chromoside A.

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SYNTHESIS OF CHROMOSE D AND CHROMOSE A

2,6-Dideoxy-4-O-methyl-D-lyxo-hexose

This compound, m.p. 151–153° (dec.), \([\alpha]_D^{25} + 82°\) (final, c 1, water), was obtained by hydrolysis of the foregoing glycoside by the procedure previously described\(^9\). Miyamoto et al.\(^4\) report m.p. 151°, \([\alpha]_D^{25} + 93\rightarrow +77°\) (final, water) and Berlin et al.\(^7\) give m.p. 158–162°, \([\alpha]_D^{23} + 98.5\rightarrow +89°\) (final, water) for natural chromose A and olivomose, respectively. The thin-layer chromatographic properties and infrared spectra of the synthetic and natural compounds were identical.

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SUMMARY

The structure of chromose D, a sugar component of the antitumour substance chromomycin A\(_2\), has been confirmed as 3-O-acetyl-2,6-dideoxy-D-lyxo-hexose by synthesis. The corresponding 4-O-acetate has been synthesised for reference purposes. An improved synthesis of chromose A is described.

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