BRIEF COMMUNICATIONS

POLYSACCHARIDES OF Polygonatum.

XI. A GLUCOMANNAN FROM Polygonatum roseum

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Continuing an investigation of Polygonatum roseum (Ledeb.) Kunth. [1], we have studied in more detail the water-soluble polysaccharides (WSPs) isolated from the rhizomes of plants collected on July 12, 1978 in the Dzhungarian Ala-Tau. Fractional precipitation with ethanol of the neutral polysaccharides gave four fractions with the following yields: I, 3.1%; II, 70.3%; III, 12.5%; and IV, 4.2%. Fraction II made up the bulk of the WSPs. A hydrolysate of it was found to contain glucose and mannose. Consequently, this fraction was a glucomannan (GM).

The IR spectrum of the GM contained absorption bands at (cm^{-1}) 890 (β-glycosidic bond), 815 (pyranose ring), and 1250 and 1740 (ester group). To determine the types of bonds between the monosaccharide residues, the GM was methylated by Hakomori's method [2], and the permethylate was subjected to formolysis and hydrolysis. The hydrolysis product was studied by TLC and GLC in the form of the corresponding polyol acetates, and 2,3,4,6-tetra-O-methyl-D-mannose, 2,3,6-tri-O-methyl-D-glucose, and 2,3,6-tri-O-methyl-D-mannose were detected. Consequently in the GM the hexapyranose residues were linked by (1 → 4) bonds.

In the products of Smith degradation [3], PC revealed the presence of erythritol, which showed the linear nature of the polymer chain. Consequently, the monosaccharide residues in the GM were studied by partial hydrolysis (0.5 N H_2SO_4, 90°C, 2 h). Glucose, mannose, glucosylmannose, and mannooligosaccharides — mannobiose, mannotriose, and mannotetraose with R_m 0.58, 0.43, 0.15, and 0.09, respectively — were revealed by PC [4].

To confirm the chemical results obtained, the GM was studied by ^{13}C NMR spectroscopy. Since the high viscosity of the solution of the GM made it difficult to record the spectrum, we decided to study the spectrum of a partially degraded GM. For this purpose, the GM was hydrolyzed with 0.05 N HCl at 85°C for 45 min, and the hydrolysate was cooled and was precipitated with 5 volumes of ethanol. The precipitate was separated off and was washed to neutrality with ethanol and was then dehydrated with acetone and dried in vacuum over P_2O_5. This gave a GM with a lower viscosity.

The chemical shifts of the carbon atoms in the ^{13}C NMR spectrum of the GM are given below:

Residue	C-1	C-2	C-3	C-4	C-5	C-6
β-D-Glucopyranose	103,6	74.3	73.8	79.8	75,8	64.3
β-D-Mannopyranose	101.3	71,3	72.7	77.7	76.3	61,8

Signals at 21.4-21.7 and at 173.6, 174.0, and 174.4 ppm showed the presence of O-Ac groups.

Thus, it may be concluded that the glucomannan of P. roseum is a linear polymer consisting of β-(1 → 4)-bound glucopyranose and mannopyranose residues that is acetylated in the native state.

LITERATURE CITED

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