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## Constituents of the Seed of *Malva verticillata*. II. Characterization of Two Novel Neutral Polysaccharides\*

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Two novel minor polysaccharides, designated as MVS-IIA and MVS-IIG, were isolated from the seeds of *Malva verticillata*. L. by affinity chromatography with Con A-Sepharose. Each polysaccharide was homogeneous on gel chromatography and glass-fiber paper electrophoresis. Gel chromatography gave values of 57000 and 10400 for the molecular weights of MVS-IIA and MVS-IIG, respectively.

MVS-IIA is composed of L-arabinose : D-galactos : D-mannose in the molar ratio of 14 : 28 : 1, and MVS-IIG is composed of D-glucose : D-galactose : D-mannose in the molar ratio of 10 : 1 : 1.

The results of methylation analysis and  $^{13}\text{C}$ -NMR spectra of the polysaccharides suggested that the minimal repeating unit of MVS-IIA is composed of six terminal  $\alpha$ -L-arabinofuranose, eight 1,5-linked  $\alpha$ -L-arabinofuranose, three terminal  $\beta$ -D-galactopyranose, fifteen 1,3-linked  $\beta$ -D-galactopyranose, ten 3,6-branched  $\beta$ -D-galactopyranose, and one terminal  $\alpha$ -D-mannopyranose. The results also suggested that the repeating unit of MVS-IIG is composed of one terminal  $\alpha$ -D-glucopyranose, seven 1,4-linked  $\alpha$ -D-glucopyranose, two 4,6-branched  $\alpha$ -D-glucopyranose, one 1,3-linked  $\alpha$ -D-galactopyranose, and one terminal  $\alpha$ -D-mannopyranose.

The controlled Smith degradation of MVS-IIA resulted in complete elimination of the sugar residues located at side chains in the molecule. It may be concluded that MVS-IIA contains the unit shown in Chart 1. The presence of  $\alpha$ -D-mannopyranosyl terminal residues is especially unique.

MVS-IIG is apparently an amylopectin-type glucan. However, the average length of unit chains in it is very short. The presence of terminal  $\alpha$ -D-mannopyranose units and 1,3-linked  $\alpha$ -D-galactopyranosyl residues is an additional unique feature of MVS-IIG as a glucan of this type.

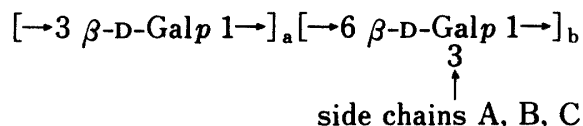


Chart 1. Structural Unit of MVS-IIA

Side chain A,  $\alpha$ -L-Araf  $1\rightarrow [5 \alpha$ -L-Araf  $1\rightarrow]_c$ ; side chain B,  $\beta$ -D-Galp  $1\rightarrow [5 \alpha$ -L-Araf  $1\rightarrow]_d$ ; side chain C,  $\alpha$ -D-Manp  $1\rightarrow [5 \alpha$ -L-Araf  $1\rightarrow]_e$

$a : b = 3 : 2$ ,  $a + b = 25$ ,  $6c + 3d + e = 8$ . side chain A : side chain B : side chain C = 6 : 3 : 1.

\* 本報告は *Chem. Pharm. Bull.*, **36**, 2778-2783 (1988) に発表.