buffer (pH gradient 5.8-8.0), and 0.1 N caustic soda gave 6 fractions with yields of 4, 5, 2, 15, 13, and 57%, respectively. The last main fraction had $[\alpha]_D^{23}$ + 190° (c 0.5; water).

Thus, fig leaves, which are a source of the production of furocoumarins [3], contain pectin substances with a low degree of esterification.

LITERATURE CITED

1. M. G. Sevag, Biochem. Z., 273, 419 (1934).
2. V. V. Arasimovich, S. V. Baltaga, and N. P. Ponomareva, Methods of Analyzing Pectin Substances, Hemicelluloses, and Pectinolytic Enzymes in Fruits [in Russian], Kishinev (1970), p. 57.
3. F. R. Kadyrova, M.-R. I. Shamsutdinov, T. T. Shakirov, N. K. Abubakirov, B. Z. Usmanov, M. B. Sultanov, and S. A. Khamidkhodzhaev, USSR Inventors' Certificate No. 419,221; Byull. Izobret, No. 10, 9 (1874).

POLYSACCHARIDES OF SAPONIN-BEARING PLANTS.

I. CHARACTERISTICS OF THE POLYSACCHARIDES OF *Allochrusa gypsophiloides*

A. O. Arifkhodzhaev and E. S. Kondratenko

UDC 547.917

Allochrusa gysophiloides Rgl.* (Turkestan soaproot; local name — etmak) has long been used in many ways because of its high content of saponins and at the present time it is being cultivated. Of the components of the roots, only the saponins have been studied chemically [1], while the other carbohydrate components, including the polysaccharides, have not been investigated.

We have studied the polysaccharides of the roots, samples of which were kindly provided by N. Motkhin (Institute of Botany, Academy of Sciences of the Uzbek SSR).

To eliminate low-molecular-weight carbohydrates and other compounds the air-dry comminuted roots were first exhaustively extracted with chloroform and with 96% and 82% ethanol, successively. Then the water-soluble polysaccharides (WSPSs) were extracted with water (1:5) at room temperature for 2 h 4 times. The extract was evaporated in vacuum, freed from proteins by Sevag's method, and precipitated with methanol (1:5).

The pectin substances (PSs) were obtained by the successive extraction with a mixture (1:1) of 0.5% solutions of oxalic acid and ammonium oxalate twice at 70°C for 2 h. The extract was dialyzed against distilled water, evaporated in vacuum, and precipitated with methanol [1:3].

The hemicelluloses (HCs) were obtained by extraction with 10% NaOH (1:3) at room temperature three times for 2 h. The solution was neutralized with acetic acid, dialyzed against distilled water, evaporated in vacuum, and precipitated with methanol (1:4).

All three polysaccharides were hydrolyzed with 1 N sulfuric acid with heating (10 h) and the monosaccharides from the hydrolysate were determined by PC in the butan-1-ol—pyridine—water (6:4:3) system, and by GLC as the acetates of the corresponding aldonotriles on a Tsvet 101. We give the amounts and monosaccharide compositions of the polysaccharides of *A. gypsophiloides*:

*This plant previously had the name of *Acanthophyllum gypsophiloides*.

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR, Tashkent.

Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 230-231, March-April, 1983. Original article submitted November 1, 1982.

0009-3130/83/1902-0222$07.50

Polysaccharide	Yield, % on absolutely dry weight	*Gal*	*Glc*	*Man*	*Ara*	*Rha*	*Xyl*	*GalUA*
WSPSs	9.2	5,0	1,0	Tr.	Tr.	Tr.	—	+
PSs	2.3	5.4	2,6	1,0	36.0	2,5	—	+
HCs	6,2	9,0	17 0	7,1	20 2	1,0	16,3	+

The methanolic mother solution after the precipitation of the WSPSs was concentrated and again precipitated with methanol (1:10). This gave 2.8% (on the weight of the plant) of a mixture of oligosaccharides from which two oligosaccharides were isolated by PC: 1) containing D-galactose and D-glucose residues in a ratio of 5.0:1.0, and 2) containing D-galactose, D-glucose, and D-xylose residues in a ratio of 2.0:2.5:1.0.

The WSPSs themselves consisted of a white amorphous powder readily soluble in water, containing no nitrogen or mineral impurities and giving a negative starch reaction with iodine. When they were separated on DEAE-cellulose (CO_3^- form), into acidic and neutral polysaccharides [2], elution with water gave 88% of a neutral polysaccharide (NPS) and elution with 1 M $(NH_4)_2CO_3$ gave 9.6% of an acidic polysaccharide (APS).

Gel chromatography on Sephadex G-50 under conditions described previously [2] showed that the neutral polysaccharide was polydisperse (molecular weights from 1000 to 2000). The NPS included galactose and glucose residues (5:1) with traces of mannose, arabinose, and rhamnose residues. Thus, the bulk of the WSPSs of *A. gypsophiloides* consists of a mixture of low-molecular-weight glucogalactans.

LITERATURE CITED

1. Zh. M. Putieva, T. T. Gorovits, E. S. Kondratenko, and N. K. Abubakirov, Khim. Prir. Soedin., 176 (1979).
2. A. O. Arifkhodzhaev, D. A. Rakhimov, and Z. F. Ismailov, Khim. Prir. Soedin., 702 (1981).

STRUCTURE OF A O-SPECIFIC POLYSACCHARIDE ISOLATED FROM THE LIPOPOLYSACCHARIDE OF *Yersinia pseudotuberculosis*, SEROVAR IA

N. A. Komandrova, R. P. Gorshkova, and Yu. S. Ovodov

UDC 547.917+576.809.6+543.544.45

Swedish workers [1] have previously put forward a structure of the trisaccharide repeating unit of the O-specific polysaccharide isolated from the liposaccharide (LPS) of the pseudotuberculosis microbe *Yersinia pseudotuberculosis*, serovar IA.

Information that we have obtained indicates that the repeating unit of this polysaccharide is a tetrasaccharide constructed of paratose, 6-deoxyheptose, galactose, and N-acetylglucosamine residues in equimolar ratio.

The lipopolysaccharide and the O-specific polysaccharide were isolated as described previously [2].

In a hydrolysate of the polysaccharide equimolar amounts of paratose, galactose, and 6-deoxyheptose were found by paper chromatography and gas–liquid chromatography (GLC). On analysis with the aid of GLC of the hydrolysate after preliminary deamination [3], 2,5-anhydromannose was detected, in addition to galactose and the 6-deoxyheptose, which shows the presence of glucosamine in the hydrolysate. Paratose is decomposed under these

Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Scientific Center, Academy of Sciences of the USSR, Vladivostok.

Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 231-232, March-April, 1983. Original article submitted November 29, 1982.