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POLYSACCHARIDES OF *Eremurus*.

XIX. PECTIN SUBSTANCES OF *Eremurus*

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In preceding communications, we have characterized the pectin substances (PSs) of *E. regelii* Vved. [1]. We now give comparative information for the pectins of: *E. anisopterus* (K. et K.) Rgl. (I); *E. comosus*, O. Fedtsch (II); *E. kaufmannii* Rgl. (III); *E. korovinii*, B. Fedtsh. (IV); *E. lactiflorus*, O. Fedtsh. (V); *E. luteus*, Baker (VI); *E. olgae* Rgl. (VII); *E. sogdianus* (Rgl.) Benth. et Hook. (VIII).

The pectins were isolated from the leaves by a known method [1]. After precipitation with ethanol, they consisted of fibrous light cream-colored powders which dissolved in water to form viscous solutions. The yields were (%): (I) 8.6; (II) 7.02; (III) 7.05; (IV) 10.6; (V) 7.8; (VI) 5.2; (VII) 17.8; (VIII) 14. The values of $[\alpha]_D^{20}$ (c 0.5; H_2O) were as follows: +124° (I); +168° (II); +80° (III); +140° (IV); +200° (V); +150° (VI); +190° (VII); +196° (VIII).

To determine their monosaccharide compositions the PSs isolated were hydrolyzed (2 N H_2SO_4, 98°C 48 h), and the hydrolysates were analyzed by PC and GLC [2]. The ratios of the monosaccharides and the quantitative characteristics obtained by the titrimetric method [3] are given below:

PS	Monosaccharide ratio						Tritrimetric results, %			%
	Rha	*Ara*	*Xyl*	*Gal*	*Glc*	*Man*	K_f	K_e	λ	CH_3O
I	27	6	1,1	11,78	1	7,02	7,02	5,16	42,4	3,5
II	10,66	2,59	1	5,96	1,9	5,7	5,7	6 3	52,1	4,5
III	10,8	3	1	6,8	1,2	Сл.	9,06	4,84	34,8	3,33
IV	11,8	2,44	1	9	1,8	1.8	10,23	5,35	34,4	3,64
V	4,27	2,8	1	1,4	Сл.	Сл.	12,6	4,72	27	3,3
VI	14,4	3,65	1	13	Сл.	5,8	5,8	6,21	51	4 3
VII	9,4	3,7	1,54	6,9	1	Сл.	7,65	3,5	31,5	2,41
VIII	19	5,5	1	11,3	6,6	1,3	13	5,97	31,5	4,06

Here, K_f are the free and K_e the methoxylated carboxy groups, λ is the degree of esterification and CH_3O represents the methoxy groups. The PSs of samples (V) and (VII) were characterized by a lower degree of esterification and percentage of CH_3O.

D-Galacturonic acid residues were present in all the samples. Samples (I)-(VIII) differed little in the qualitative respect and the differences were mainly quantitative. Rhamnose, arabinose, and galactose residues predominated. There was a larger proportion of mannose residues in samples (I), (II), and (VI) than in the others.

The PSs of *E. lactiflorus* were studied in more detail. The amount of uronic anhydride determined by a standard method [4] was 67%. Mol. wt. ∿ 67,000 (viscosimetrically). Separation on DEAE-cellulose gave a neutral fraction from a phosphate eluate (0.025 M; 0.05 M; 0.5 M NaH_2PO_4) with a yield of 18%. From an alkaline eluate (0.1 N and 0.2 N NaOH), and acid fraction was obtained with a yield of 78%. A hydrolysate of the neutral fraction (2 N H_2SO_4, 98°C, 24 h) was shown by PC to contain rhamnose, arabinose, xylose, and galactose, and

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a hydrolysate of the acid fraction (2 N H_2SO_4, 98°C, 32 h) contained D-galacturonic acid and the same monosaccharides as in the neutral fraction.

The partial hydrolysis of the PSs (2 N H_2SO_4, 98°C, 4 h) gave a polyuronide (yield 25%). D-Galacturonic acid was detected in the products of acid and enzymatic ("Fluka" pectinase) hydrolysis. The IR spectrum of the polyuronide had the following absorption bands: 3400, 2930, 1750, 1630, 1410, 1310, 1230, 1020, 1110, 950, 890, 830 cm^{-1}.

The formation of the polygalacturonide on partial hydrolysis, its cleavage by pectinase, and the absence of acidic oligosaccharides from the hydrolysis products indicate the presence in the pectin molecule of polygalacturonide sections having no side chains.

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A PHYTOCHEMICAL INVESTIGATION OF THE EPIGEAL PART OF *Adonis aestivalis*

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Continuing an investigation of plants of the genus *Adonis* [1], we have studied the cardenolide composition of the epigeal part and the fatty-acid composition of the lipids of the fruit of *Adonis aestivalis* L. (summer adonis) collected in crimea province in the flowering-fruit-bearing period. By chromatography of an ethanolic-chloroform extract on alumina (Brockman grade III) and rechromatography on silica gel, we isolated two individual substances (1) and (2).

Substance (1) — $C_{23}H_{32}O_6$, mp 136-138/230°C, $[\alpha]_D^{20}$ +42 (c 0.1; ethanol).

Substance (2) — $C_{36}H_{54}O_{11}$, mp 196-203°C, $[\alpha]_D^{20}$ +31.8° (c 0.1; ethanol).

On the basis of color reactions (Legal, Raymond, Lieberman, Keller-Kiliani, etc.), UV spectra, and the absence of depressions of the melting points with authentic samples, it was established that substance (1) was strophanthidin, and substance (2) k-strophanthidin-β [2].

The fatty oil was extracted from the fruit with petroleum ether (bp 40-70°C). The fatty oil content amounted to 17.46%.

Physicochemical constants of the oil, refractive index n_D^{20} — 1.4754; acid No., mg KOH/g — 5.14; saponification No., mg KOH/g — 192.37; iodine No., % iodine — 134.16; thiocyanogen No., % iodine — 78.52.

The fatty acid composition of the oil determined by gas-liquid chromatography [3] was as follows: (%) $C_{3:0}$ — 0.4, $C_{14:0}$ — 0.2 $C_{16:0}$ — 12.5, $C_{16:1}$ — traces, $C_{18:0}$ — 2.1, $C_{18:1}$ — 12.7, $C_{18:2}$ —72.1, $C_{18:3}$ — traces.

From the value of the iodine No. and the fatty acid composition, the oil may be assigned to the semidrying type.

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