Hydrogenation of the double bond of the furan ring markedly changes the nature of the spectrum. In compounds IV and V signals of the protons of the methyl group of C_4 and of the benzene ring undergo a considerable diamagnetic shift ($\Delta\delta_5$ = −0.66 ppm; $\Delta\delta_8$ = −1.07 ppm). A one-proton multiplet of the C'_5 methine group appears at 4.86 ppm. The protons of the C'_4 methylene group, being nonequivalent, form with the C'_5 methine proton a system of the AKX type with two well-separated quartets (in the AK part). A signal in the stronger field (2.75 ppm, J_{AK} = 15 Hz) must be ascribed to a proton present in the cis position relative to the methyl group at C'_5.

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HYPERIN FROM SORBUS TIANSCHANICA

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Khimiya Prirodnykh Soedinenii, Vol. 5, No. 2, p. 121, 1969

Sorbus tianschanica Rupr. (Tien-Shan mountain ash) is a small tree or shrub of the family Rosaceae which is distributed in the mountain regions of Central Asia and western China.

Branches freed from leaves (2.5 kg) collected in the fruit-bearing phase in the Irdyk gorge, Issyk-Kul'skaya basin were extracted with methanol. The residue after the methanol had been driven off was treated with 0.5 *l* of water and the filtrate was then extracted with benzene, ether, ethyl acetate, and butan-1-ol.

The total material from the ethyl acetate extract was dissolved in 10% ethanol and transferred to a column of polyamide. The column was washed with water, and then methanol—water (1 : 1) eluted 12 g (0.48% of the air-dry material) of a crystalline substance with mp 223–224° C. On the basis of qualitative reactions, the substance isolated is a flavonol glycoside. Its acid hydrolysis gave equimolar amounts of quercetin (mp 315–317° C; pentaacetate, mp 195–197° C) and galactose (thin-layer and paper chromatography in the presence of reference samples. The position of the sugar was determined by the exhaustive methylation of the glycoside by means of dimethyl sulfate, followed by acid hydrolysis. This gave 3-hydroxy-3',4',5,7-tetramethoxyflavone with mp 194–194.8° C, which shows that the galactose is attached to the 3-hydroxy group of the quercetin. Thus, the substance isolated is hyperin, as was also confirmed by the results of a direct comparison with an authentic sample [1].

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FLAVONOLS OF SOLIDAGO CANADENSIS

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Five substances of a flavonoid nature (table) have been isolated by chromatography on polyamide from the epigeal part of *Solidago canadensis* L., family Compositae (Canada goldenrod) collected in the flowering period.

By their qualitative reactions, physicochemical properties, UV spectra with complex-forming and ionizing additives, and their conversion products, substances I, II, and III have been identified as 3,5,7,3',4'-pentahydroxyflavone (quercetin), 3,5,7,4'-tetrahydroxyflavone (kaempferol), and 5,7,3',4'-tetrahydroxyflavone-3-rutinoside (rutin).

Results of a Spectral Study of the Flavonoids of Solidago canadensis

Substance No.	Substance	Mp, °C	Empirical composition	Absorption bands	UV spectra				
					λ, mμ, of the initial solution	the same + sodium acetate	the same + sodium methoxide	the same + boric acid + sodium acetate	the same + aluminum chloride
(I)	Quercetin	311—314	$C_{15}H_{10}O_7$	I	370	385*	332	385	456
						322			330*
					300*			300*	
					270**				
					255	273	245*	258	271
(II)	Kaempferol	280—285	$C_{15}H_{10}O_6$	II	365	375	407	365	422
					320*		321*	520*	347*
					300*	305*			305*
					267	273	275	267	270
(III)	Rhamnetin	188—192	$C_{27}H_{30}O_{16}$	I	356	395	408	375	430
						322*	325*		
					295*			300*	300*
					265**				
					258	273	271	261	271
(IV)	Isorhamnetin	303—308	$C_{16}H_{12}O_7$	II	367	380	333	368	428
						320*			355*
					300*			305*	300*
					267*				
					254	275	245*	253	263
(V)	Isorhamnetin 3-glucorhamnoside	165—170	$C_{28}H_{32}O_{16}$	I	355	393	412	355	405
						320*	330**		365*
					300*			298*	302*
					265**			267**	
				II	255	273	272	255	267

*Low-intensity absorption bands

**Shoulder

Substance IV differs only slightly from quercetin in its behavior with additions of sodium acetate and methoxide. With the addition of boric acid and sodium acetate, band I of the UV spectrum of substance IV, unlike the same band in the case of quercetin, undergoes no change in comparison with the initial solution. This fact permits the assumption that the hydroxyl group in position 3' is etherified. From its physicochemical properties and by means of paper chromatography, substance IV has been identified as 3,5,7,4'-tetrahydroxy-3'-methoxyflavone (isorhamnetin). A mixture of substance IV and isorhamnetin gave no depression of the melting point.

Substance V consists of a diglycoside of isorhamnetin. From the products of the acid hydrolysis of substance V we have isolated isorhamnetin and, as sugar components, glucose and rhamnose. The UV spectra show that the sugar components are present in position 3.

The sample of isorhamnetin was given to us by N. F. Komissarenko.

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Khar'kov Chemical and Pharmaceutical Scientific-Research Institute

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FLAVONOIDS OF AFLATUNIA ULMIFOLIA

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Aflatunia ulmifolia (Franch.) Vass. is a shrub of the family Rosaceae distributed in the mountain of Central Asia and Kazakhstan. The raw material for the investigation was branches freed from leaves collected in the fruit-bearing phase in the Tereksai gorge of the Talas Ala-Tau.

An aqueous extract of the dry ethanolic extract was extracted successively with petroleum ether, ether, and ethyl acetate. The residue after the evaporation of the ethyl acetate was recrystallized from aqueous ethanol giving a substance having the composition $C_{21}H_{20}O_{11} \cdot 2H_2O$, mp 187–189° C, with a yield of 0.4%. Its acid hydrolysis led to equi-