3. M. S. Dudkin and N. A. Denisyuk, Khim. Prir. Soedin., 20 (1984).
4. S. Eda and K. Kato, Agric. Biol. Chem., 41, No. 3, 429 (1977).
5. G. N. Zaitseva and T. P. Afanas'eva, Biokhimiya, 22, 3 (1967).
6. O. I. Babicheva, G. A. Ivanova, and S. M. Nemets, The Technological and Chemical Control of the Vegetable-Drying and Food-Concentrate Industry [in Russian], Moscow (1967), p. 296.

POLYSACCHARIDES OF *Bunium persicum*

D. A. Rakhimov, N. P. Yuldasheva, Kh. Ubaev, and S. A. Khamidkhodzhaev

UDC 547.917

We have previously reported on an investigation of the oil and carbohydrates from the seeds of *Bunium persicum* (Boiss.) K.-Poll. [1].

We now give results of the study of the polysaccharides in the roots and stems of the plants collected in the Hissar range (Uzbek SSR) in the periods of flowering and fruit-bearing.

The polysaccharides were isolated from one sample of raw material in the following sequence: first the water-soluble polysaccharides (WSPs), then the pectin substances (PSs), and the hemicelluloses (HMCs) (%):

Phase of development	Plan organ	VSPSs	PSs	HMCs
Flowering	Stem	1.2	6.6	2.9
	Roots	1.6	13.8	4.8
Fruit-bearing	Stem	0.6	10.75	14.7
	Roots	11.29	12.54	16.3

Most of the polysaccharides were present in the roots. In the flowering phase the pectin substances and in the fruit-bearing phase hemicelluloses predominated.

To determine the qualitative and quantitative compositions of the carbohydrates, the polysaccharide fractions (isolated in the fruit-bearing phase) were subjected to complete acid hydrolysis (2 N H_2SO_4, 100°C, 24 h), and the sugars in the hydrolysate were investigated by PC and GLC [2]. The relative amounts of monosaccharides are given below:

Plant organ	Polysaccharide	*Gal*	*Glc*	*Man*	*Xyl*	*Ara*	*Rha*	*GalUA*
Stems	NSPSS	1.2	—	1.7	1.6	1.5	1.0	—
	PSS	2.0	1.2	Tr.	1	4.3	8.1	+
	HMCS	1.3	4.7	1	16.8	1.4	2.8	+
Roots	NSPSS	3.4	11	1	1	1.4	2.8	—
	PSS	1	1	Tr.	2.1	1	19.2	+
	HMCS	1.4	6.7	1	30.2	2.8	2.4	+

In contrast to the seeds [1], in the stems and roots, of neutral sugars rhamnose predominated in the pectin substances and xylose in the hemicelluloses.

The pectin substances of the stems consisted of fibrous material soluble in water giving 1.0 and 0.5% aqueous solutions having relative viscosities of 4.0 and 2.2, respectively. They gave no starch reaction with iodine.

Thus, the polysaccharides of the stems and roots of *Bunium persicum* are represented by biopolymers of various natures: water-soluble polysaccharides, pectin substances, and hemicelluloses.

LITERATURE CITED

1. D. A. Rakhimov, G. A. Stepanenko, Kh. Ubaev, A. I. Glyshenkova, and E. S. Kondratenko, Khim. Prir. Soedin., 244 (1984).

Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 136-137, January-February, 1987.

 0009-3130/87/2301-0116$12.50

2. N. P. Yuldasheva, D. A. Rakhimov, and E. S. Kondratenko, Khim. Prir. Soedin., 172 (1985).

PHENOLCARBOXYLIC ACIDS OF THE *Onobrychium* SECTION OF THE GENUS *Astragalus*

N. N. Guzhva, M. S. Luk'yanchikov, L. I. Dranik

UDC 547.814.5:582.739

We have previously [1, 2] reported that total preparations have been isolated from the epigeal parts of milk vetches of the *Onobrychium* Bunge section of the *Astragalus* genus (*Astragalus sevangensis* Grossh., *A. circassicus* Grossh., *A. levieri* Freyn Ö.B. L., *A. goktschaicus* Grossh., *A. bungeanus* Boiss., *A. interpositus* Boriss., and *A. arguricus* Bunge) and, later, a high antimicrobial activity in relation to pathogenic cocci and coli bacteria was established.

A preliminary investigation (paper chromatography) of the total preparations of the milk vetches under investigation showed the presence in them not only of flavonoid compounds but also of phenolcarboxylic acids.

In view of the high antimicrobial properties of phenolcarboxylic acids [3], it may be assumed that the manifestation of this activity by the total preparations from milk vetches is due just to the presence in them of these acids, and these have now become an object of our study.

The total substances were isolated and purified as described in [4] and were then deposited on a column of polyamide sorbent. Elution was performed with hexane, hexane–ethyl acetate (9:1, 8:1, 7:1, etc.), and individual substances (1-5) were then crystallized from aqueous and aqueous ethanolic solutions.

The fractions were monitored by paper chromatography in the following systems: 1) 2% CH_3COOH, and 2) butan-1-ol–CH_3COOH–H_2O (4:1:5). A comparison of chromatographic mobilities, differentiating staining with a stabilized diazonium salt, and the results of acid hydrolysis (2 N HCl, 30 min), of elementary analysis, and of UV spectroscopy, and also a comparison with authentic samples enabled the acids isolated to be identified as the known acids p-hydroxybenzoic, caffeic, chlorogenic, ferulic, and 3-feruloylquinic.

LITERATURE CITED

1. N. N. Guzhva, M. S. Luk'yanchikov, and A. L. Kazakov, Khim. Prir. Soedin., 411 (1985).
2. N. N. Guzhva, M. S. Luk'yanchikov, and A. L. Kazakov, Khim. Prir. Soedin., 529 (1983).
3. S. I. Zelepukha, The Antimicrobial Properties of Plants Used in Fruits [in Russian], Kiev (1973).
4. A. L. Kazakov, M. S. Luk'yanchikov, S. F. Dzhumyrko, V. A. Kompansev, Khim. Prir. Soedin., 388 (1981).

Pyatigorsk Pharmaceutical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 1, pp. 137-138, January-February, 1987. Original article submitted May 11, 1986.

0009-3130/87/2301-0117$12.50