On the basis of the results of spectral analysis, a study of the mobilities of the substance isolated, acid hydrolysis, and chromatographic comparison with authentic samples, the anthocyanins of the bog bilberry were characterized as delphindin 3-galactoside, delphindin 3-arabinoside, cyanidin 3-glucoside, cyanidin 3-galactoside, petunidin 3-galactoside, petunidin 3-arabinoside, malvidin 3-galactoside, and malvidin 3-arabinoside. These results agree with those reported from the USA [5, 6].

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FREE PHENOLIC CARBOXYLIC ACIDS OF Secale

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The wide distribution of phenolic carboxylic acids in the tissues of higher plants [1], the existence of growth-inhibiting activity in many of them [2], and their participation in the process of photosynthesis [3] and protective reactions against fungal and bacterial infections [4] prompt an investigation of these compounds in the organs of economically useful species.

The isolation and identification of the free phenolic carboxylic acids or rye was performed by the methods described in [2]. As the initial material we used the leaves of 20-day rye plants of the variety Khar'kovskaya 60 grown under artifical illumination.

In the ethereal fraction, on chromatographic separation by the two-dimensional ascending method on FN 12 paper in the solvents isopropanol—amonia—water (12:1:1) and 5% CH_3COOH, 13 components giving qualitative reactions for phenols were detected. On the basis of their combinations of properties they were divided into two groups.

One group of substances (eight compounds) had a light or deep blue fluorescence in UV light which was intensified in NH_3 vapor or on treatment with NaOH. The same components formed cis and trans isomers when they were chromatographed in weak acetic acid and in 20% KCl. The λ_{max} values in 96% ethanol of these compounds were in the 280-330 nm region. They were assigned to the hydroxycinnamic acids.

Another group of substances (five compounds) absorbed in the UV region, did not form cis and trans isomers, and had λ_{max} in the 250-280 nm region. They were assigned to the hydroxybenzoic acids.

A comparison of the solubilities, chromatographic mobilities, differential colorations with a stabilized diazonium salt, and the full UV spectra (96% ethanol) of the acids isolated with the analogous properties of markers permitted the main phenolic components of rye to be identified as p-coumaric acid (shoulder at 286 nm), ferulic acid (λ_{max} 320 nm), vanillic acid (λ_{max} 258, 286 nm), and p-hydroxybenzoic acid (λ_{max} 256 nm). Protocatechuic acid (λ_{max} 258,

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290 nm) and sinapic acid (λ_{max} 320 nm) were identified as minor components, and the total amount of the main phenolic carboxylic acids was 42 μg/g of dry matter with a predominance of p-coumaric acid (24 μg/g) and ferulic acid (6 μg/g).

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PHENOLIC COMPOUNDS OF *Euphorbia ferganensis*

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In Uzbekestan grow 33 species of *Euphorbia*. They are all resin-bearing and some of them are used in folk medicine [1]. Abroad 44 species of *Euphorbia* have been investigated, and a number of compounds have been isolated from them. The species of plants of the genus *Euphorbia* growing in Uzbekestan have been studied to only a small extent.

The comminuted roots of *Euphorbia ferganensis* B. Fedtsch (2 kg) collected on the slopes of the foothills of the Kurgantepa region, Andizhan province, in 1981 were exhaustively extracted with ethanol. The extract was concentrated in vacuum and the residue was diluted with water and extracted successively with chloroform, ethyl acetate, and butanol.

The ethyl acetate fraction was chromatographed on a column of silica gel. Elution with benzene–ethanol yielded the crystalline substances (I) and (II).

Substance (I), 158-160°C, M^+ 198, composition $C_9H_{10}O_8$ had two absorption maxima in the UV spectrum: $\lambda_{max}^{C_2H_5O}$ 219, 277 (log ε 3.95, 3.53). Its IR spectrum had the abosrption bands of hydroxy group (3465, 3318 cm^{-1}), of an ester carbonyl (1701 cm^{-1}), and of an aromatic nucleus (1622, 1540, 1261, 1205 cm^{-1}).

The PMR spectrum had signals in the form of a three-proton triplet at 1.03 ppm (J = 7 Hz, $-CH_2-CH_3$, of a two proton quartet at 4.10 ppm (J = 7 Hz, $-O-CH_2-CH_3$), and of a two-proton singlet at 7.66 ppm.

The PMR spectrum, and also the presence in the mass spectrum of ions with m/z 170 ($M - CH_2{=}CH_2$) and 153 ($M - OCH_2-CH_3$) showed that the compound was the ehtyl ester of an aromatic acid. The mild alkaline hydrolysis of (I) yielded gallic acid. On the basis of the facts given above, substance (I) was identified as ethyl gallate, which is considered an antibiltic of higher plants [3].

Substance (II), M^+ 192, composition $C_{10}H_8O_4$. Its IR spectrum contained absorption bands at 3348 cm^{-1} (OH group), 1705 cm^{-1} (C=O of an α-pyrone), 1650, 1611, 1570 cm^{-1} (aromatic C=C bonds). By a study of its UV, IR, and PMR spectra, and also by a direct comparison with an authentic sample, compound (II) was identified as the coumarin scopoletin [4].

The study of the components of *E. ferganensis* is continuing.

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