Flavonoid (II) had the composition $C_{19}H_{18}O_7$, M^+ 358, $\lambda_{max}^{ethanol}$ 282, 317, 366 nm (log ε 4.02, 3,91, 3.66); ν_{max}^{KBr} (cm^{-1}) 3320-3370 (OH); 1654 (C=O of a γ-pyrone); 1591, 1565 aromatic C=C bonds). The mass spectrum of (II) contained the peaks of ions with m/z 358 (M^+, 78.6%), 344 (3), 343 (100), 328 (1), 223 (1.2), 211 (1), 205 (1), 87 (1.2) 145 (15.7) 129 (23.6), 115 (18.6), 105 (25.4), 97 (30) and others.

The PMR spectrum of (I) ($CDCl_3$) showed the presence in it of four methoxy groups (3.78 ppm, 3 H, s; 3.85 ppm, 6 H, s; 4.05 ppm, 3 H, s) and of a monosubstituted benzene ring (7.37-7.60 ppm, 3 H, m, H-3',4',5'; 7.98-8.23 ppm, 2 H, m, H-2',6').

It follows from the facts given above that in both compounds ring B was unsubstituted, and flavonoid (I) contained three methoxy and two hydroxy groups while (II) contained four methoxy and one hydroxy groups.

On methylation with diazomethane, (I) was converted completely into (II) and further methylation of the latter with CH_3I in the presence of potassium carbonate in acetone led to 3,5,6,7,8-pentamethoxy flavone with mp 87-88°C [1].

The facts given above show that (I) had the structure of 3,5-dihydroxy-6,7,8-trimethoxyflavone and (II) that of 5-hydroxy-3,6,7,8-tetramethoxyflavone. Flavonoid (I) has been isolated previously from two species of Helichrysum [3, 4], while (II) has been obtained semisynthetically [3], but this is the first time that it has been detected in a plant.

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ANTHOCYANINS OF THE FLOWERS OF PLANTS OF Tulipa GENUS

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The anthocyanins of different varieties and species of the tulip have been widely studied [1-5]. We give information on the qualitative composition and amounts of anthocyanins in tulips cultivated on the Apsheron peninsula.

The freshly gathered tulip flowers were comminuted and were homogenized with glass powder. The anthocyanins were extracted with 80% ethanol containing 1% of HCl. The combined anthocyanins so obtained were investigated by chromatography on paper (FN-16) in various solvent systems: 1) butanol–acetic acid–water (4:1:2); 2) water–acetic acid–conc. HCl (82:15:3); 3) water–acetic acid–conc. HCl (10:3:30); and 4) water–formic acid–conc. HCl (3:2:5). The chromatographic analysis showed that the largest set of anthocyanins was present in the flowers of the tulip variety Prominikas. The combined anthocyanins of the variety Prominikas were chromatographed on a column of cellulose in system 2 and were separated into mono- and diglucosides. The group of anthocyanins was separated by preparative paper chromatography in system 2, [sic]. Clearly separated zones were cut out and the anthocyanins were eluted with methanol–acetic acid–water (90:5:5). In this way we obtained five individual anthocyanins. Some of their characteristics are given below:

Substance	R_f in system 1	R_f in system 2	λ_{max} in methanol	Aglycone	Sugar residue
I	0,27	0,19	534	Delphinidin	Glucose
II	0,39	0,27	524	Cyanidine	Glucose
III	0,42	0,39	505	Pelargonidine	Glucose
IV	0,29	0,40	524	Cyanidine	2 moles glucose
V	0,31	0,44	505	Pelargonidine	2 moles glucose

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The results of a study of the products of acid hydrolysis, UV spectra, and R_f values in paper chromatography in various sy stems permitted the anthocyanins isolated from the flowers of the tulip variety Prominikas to be identified as follows: (I), delphinidin 3-glucoside; (II), cyanidin 3-glucoside; (III), pelargonidin 3-glucoside; (IV), cyanidin 3,5-diglucoside; and (V), pelargonidin 3,5-diglucoside.

Of the nine varieties of tulip that we studied, all these substances were detected only on Prominikas and the species Schmidt and Foster. The varieties Khudozhnik, Lefeber [Lefèvre (?)] Oksford [Oxford (?)], and Parad [Parade (?)], and the species Yulii ("July") contained substances (II), (III), (IV), and (V). Only substance (I) was detected in the Golden variety, and substances (II) and (III) were detected in the species Eichler and Florenskii [Florensky].

The amounts of anthocyanins in the fresh petals were as follows (%): Khudozhnik 2.44, Lefeber 4.67; Oksford 2.68, Parad 2.33, Prominikas 5.83, Golden Apledron 0.36, Florenskii 3.43, Eichler 12.96, Yulii 5.11, Shrenka 8.32, Shmidt [Schmidt] 4.57, Foster 4.58.

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ESSENTIAL OILS Origanum tyttanthum

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Origanum tyttanthum Gontsch. is an endemic plant of Central Asia and the south of Kazakhstan. It grows predominantly in the central mountain zone among the tree-bush vegetation and in the subalpine zone on fine-grained and gravelly soils [1, 2].

The essential oil of O. tyttanthum is used in the foodstuffs and perfumery industries [3]. In the fresh and in the dried form the plant is consumed in meat and fish dishes, and it is used for preparing hot infusions, vermouths, and nonalcoholic beverages.

The yield of essential oil is greatest in the period of flowering, and it contains about 75% of terpineol, 4% of camphor, and 5.4% of linalyl acetate [4, 5], while according to Kudryashev at a yield of 0.5% the oil contains from 35 to 66% of phenols: thymol and carvacrol [6]. As we see, information on the chemical composition of the essential oil is contradictory.

We have studied the essential oil of Origanum tyttanthum collected in the Chimkent province of Kazakhstan on the northern slope of the Kastekskii range in the flowering phase. It was obtained by steam distillation with a yield of 1.15%. The oil considted of a yellow-brown liquid with a phenolic odor and had n_D^{20} 1.5195, d_{20}^{20} 0.9506, $[\alpha]_D^{20}$ − 38.8°.

Phenols and acids were isolated from the whole oil by the usual procedure [7]. The phenolic fraction amounted to 70% of the whole oil, n_D^{20} 1.5195, and the IR spectrum had a broad band of the stretching vibrations of an OH group bound by an intermolecular hydrogen bond at 3400 cm^{-1} and the bands of the stretching vibrations of aromatic C−H bonds at 3045 cm^{-1} and of C=C bonds at 1580, 1495, and 1460 cm^{-1}.

This fraction was investigated by GLC on a Vyrukhrom chromatograph with a flame-ionization detector using 0.3 × 300 cm steel column filled with 15% of PEG adipate on Chromaton, and also on a LKhM-4 instrument with a 0.4 × 300 cm column containing 15% of PEG succinate on Chromaton NAW. The analysis was performed with linear programming of the temperature

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