The results of a study of the products of acid hydrolysis, UV spectra, and R_f values in paper chromatography in various systems 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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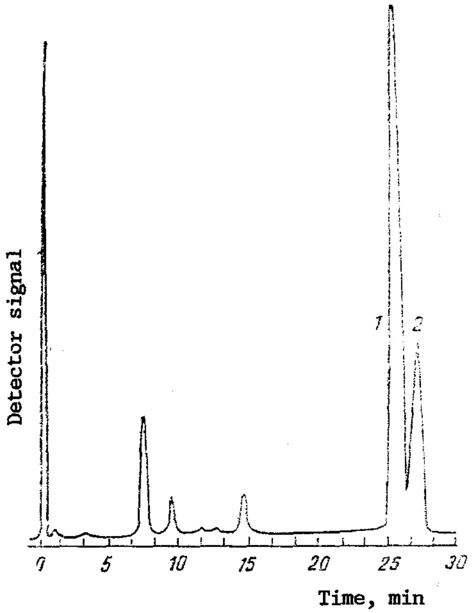

Fig. 1

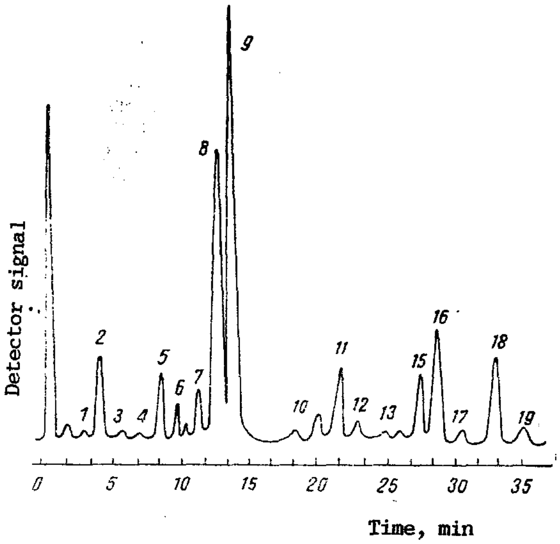

Fig. 2

Fig. 1. Chromatogram of the phenolic fraction of O. tyttanthum: 1) thymol; 2) carvacrol.

Fig. 2. Chromatogram of the neutral fraction of the essential oil of Origanum tyttanthum: 1) α-thujene; 2) α-pinene; 3) camphene; 4) β-pinene; 5) sabinene; 6) myrcene; 7) α-terpinene; 8) limonene; 9) 1,8-cineole; 10) n-octanol; 11) linalyl acetate; 12) linalool; 13) bourbonene; 14) elemene; 15) terpinenol-4; 16) caryophyllene; 17) α-humulene; 18) borneol; 19) α-terpineol.

from 80 to 195°C at the rate of 4°C/min with a detector temperature of 200°C, an evaporator temperature of 210°C, and a rate of flow of helium of 120 ml/min.

The chromatograms were identical (Fig. 1) and contained peaks corresponding to thymol (49.6%) and carvacrol (19.8%).

The acid fraction yielded traces of triterpene acids which were identified with markers by TLC on Silufol (ethyl acetate—hexane (1:3) system; R_f 0.6, the spots being revealed with a saturated solution of antimony trichloride in chloroform and giving a pink coloration on heating to 120°C) as ursolic and oleanolic acids.

The neutral fraction of the essential oil was analyzed on a Vyrukhrom chromatograph (0.3 × 300 cm column, PEG, mol.wt. 1540, 7% on Celite 80-100 mesh with temperature programming from 80 to 160°C at 2°C/min).

From their retention times and the increase in the size of the peaks on the addition of known substances to the sample being analyzed, the following components were identified (% on the whole oil): α-thujene, 0.1; α-pinene, 1.58; camphene, 0.3; β-pinene, 0.3; sabinene, 1.56; myrcene, 0.3; α-terpinene, 0.32; limonene, 7.1; 1,8-cineole, 10.3; n-octanol, 0.2; linalyl acetate, 0.3; linalool, 1.22; bourbonene, 0.2; elemene, 0.2; terpinenol-4, 0.8; caryophyllene 3.0; α-humulene, 0.1; borneol, 2.0; α-terpineol, 0.1 (Fig. 2).

Origanum tyttanthum has been recommended for use previously together with wild marjoram (Origanum vulgare) in medical practice, since its content of phenols and the yield of its oil even exceed those of officinal marjoram.

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ALKALOIDS OF THE ROOTS OF Papaver oreophilum

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Papaver oreophilum Rupr. – a representative of the section Pseudo-Pilosa M. Pop. – is endemic but in our country is found in the wild form only in the Caucasus [1, 2].

The alkaloid composition of cultivated forms of this plant has been widely studied [3-5].

We give the results of a study of the alkaloids of the roots of P. oreophilum collected in North Ossetia (Kurtatinskoe gorge, flood plain of the R. Fiagdon) in the phase of mass flowering.

Methanolic extraction of the air-dry roots gave 0.31% of combined alkaloids, which were separated into phenolic and nonphenolic fractions.

By column chromatography on silica gel, the nonphenolic fraction yielded protopine, α-allocryptopine, mecambridine, and a base with mp 175-176°C.

All the known alkaloids were identified by their spectral characteristics (IR, UV, mass, and PMR spectra), and also by means of mixed melting points with authentic samples.

The base with mp 175-176°C, $[\alpha]_D$ −210° (c 0.8; chloroform). The UV spectrum of the base contained two absorption maxima, at 290 and 308 nm (log ε 3.56 and 3.68). In the IR spectrum of the base there were absorption bands at (cm^{-1}) 940 and 1040 (methylenedioxy group), 1610 (aromatic ring), and 1770 (γ-lactone carbonyl group). The PMR spectrum of the base, taken in deuterochloroform, showed signals in the form of three-proton singlets at 2.56 ppm from a N-methyl group and at 3.85, 4.04, and 4.08 ppm from methoxy groups, and also a two-proton singlet at 5.96 ppm from a methylenedioxy group. At 4.40 and 5.57 ppm there were two one-proon doublets with J = 4 Hz. One-proton doublets appeared in the aromatic region of the spectrum at 6.00 and 6.86 ppm (J = 8 Hz), together with a one-proton singlet at 6.30 ppm.

The mass spectrum of the base lacked the peak of the molecular ion, and the maximum peak was 1 m/z 220.

The spectral characteristics given, and also the properties of the base agree well with those of L-narcotine [6]; consequently it was narcotine. This is the first time that this compound has been isolated from P. oreophilum.

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