It was established that glycosides 1, 4, and 5 contained the same aglycone — cyanidin; glycosides 2 and 3, pelargonidin; and glycosides 6 and 7, malvidin. Glucose was found in the hydrolysates of glycosides 1–4, and galactose in that of glycoside 5. On the basis of the results of a study of the chromatograms in the UV and visible regions, without and with the addition of aluminum chloride and of a study of the mobilities of the anthrocyanin glycosides on paper chromatography in various solvent systems, and of the products of complete and stepwise hydrolysis, together with a chromatographic comparison with authentic samples, substance (1) was identified as cyanidin 3,5-diglucoside (cyanin); (2) as pelargonidin 3,5-diglucoside (pelargonin); (3) as pelargonidin 3-glucoside; (4) as cyanidin 3-glucoside (chrysanthemin); and (5) as cyanidin 3-galactoside. Because of their small amounts, compounds (6) and (7) could not be identified completely. It was established that they are malvidin derivatives.

Cyanin is quantitatively the predominating component of the anthocyanin complexes of the fruits of these species.

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THE ESSENTIAL OIL OF THE LEAVES OF *Citrus limonia*

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UDC 547.913

Among species similar to the lemon, the Meyer Chinese lemon (*Citrus limonia* Osbeck) has been widely introduced into the USSR [1]. The fruit of the Meyer lemon is considerably inferior in quality to the fruit of ordinary lemons *C. limon* Burm, but because of its comparatively high frost- and malsecco-resistance a great increase in the amount of it being planted is observed.

The essential oil obtained from the flowers and the ring of the fruit of the Meyer lemon growing in Georgia has been well studied [2, 3]. There is no information in the literature on the composition of the essential oil of the leaves.

We give the results of an investigation of the chemical composition of the essential oil isolated by steam distillation from the leaves of the Meyer lemon. The leaves were collected in the period of the forced dormancy of plants growing in Sukhumi. The amount of essential oil in the leaves was 0.32%. The components of the essential oil were identified by gas-liquid chromatography, through a comparison of the retention times of the components of the essential oils with the retention times of known terpenes on columns with stationary phases of different polarities. All the gas-liquid chromatographic operations were performed on a Varian Aerograph 1860 instrument using a flame-ionization detector. The best separation of the whole oil was achieved on 550 × 0.2 cm columns containing as stationary phases 5% of SE 30 and 10% of FFAP on Chromosorb W 80/100 mesh. The rate of flow of helium was 40 ml/min. The thermostat of the column was programmed from 100 to 220°C. The amounts of the components of the essential oil of the leaves of the Meyer lemon were as follows (% on the whole oil): α-pinene, 0.3; β-pinene, 0.7; sabinene, 1.0; myrcene, 1.0; d-limonene, 66.7; γ-terpinene, 2.9; p-cymene, 2.0; linalool, 4.0; terpinen-4-ol, 3.1; nonanol, 1.4; neryl acetate, 0.9; citronellol, 1.4; geranial, 0.5; β-bergamotene, 0.8; β-bisabolene, 0.8; nerol, 0.8; geraniol, 1.3; thymol 1.1. Camphene, ocimene, terpinolene, linalyl acetate, and neral were detected in the oil in trace amounts.

As compared with the essential oils of ordinary lemons [4-7], the process of terpene biosynthesis in the essential oil of the leaves of Meyer lemon is characterized by a marked

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Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 523-524, July-August, 1982. Original article submitted March 22, 1982.

0009-3130/82/1804-0495$07.50

increase in the amount of d-limonene and a fall in the amounts of neral and geranial.

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A STUDY OF *Cymbochasma borysthenica*

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UDC 547.972

We have investigated the epigeal part of the endemic relict plant *Cymbochasma borysthenica* (Pall.) Klok. et Zoz. (∿Dnepr cymbochasma), family Scrophulariaceae [1, 2] collected in the phase of mass-flowering in the environs of the town of Zaporozh'e. By one- and two-dimensional chromatography we established the presence of not less than five iridoids, eight flavonoids, and five hydroxycinnamic acids. With the aid of a known procedure [3], we obtained five substances (I–V) in the individual state.

Substance (I), composition $C_{15}H_{22}O_{10}$, mp 204–206°C, formed with the Bacon–Edelman reagent [4] a brown-colored solution with a bright yellow fluorescence in UV light. On paper chromatograms, it was detected after treatment with the reagent mentioned in visible light by its yellow-orange color and in UV light by its lemon-yellow color but it was not revealed by Trim and Hill's [5] and Stahl's [6] reagents. The results of an investigation of the products of acid, alkaline, and enzymatic (emulsin) hydrolyses, and also features of the IR region of the spectrum permitted the substance isolated to be identified as catalpol. We did not detect aucubin-like iridoids by paper chromatography after visualization with specific reagents [5, 6].

Substance (II), composition $C_{21}H_{20}O_{10}$, mp 253–256°C, and substance (III), composition $C_{21}H_{18}O_{11}\cdot H_2O$, mp 334-340°C, were subjected to acid and enzymatic (emulsin) hydrolyses, and in the corresponding products apigenin, D-glucose and glucuronic acid were detected by paper chromatography. An investigation in the UV region of the spectrum using diagnostic reagents enabled these substances to be characterized as apigenin 7-O-β-D-glucoside (II) and apigenin 7-O-β-D-glucuronide (III). In addition to apigenin glycosides, the epigeal part of the plant also contained luteolin glycosides.

Substances (IV) and (V) were assigned to the hydroxycinnamic acids and by a direct comparison with authentic samples they were identified as caffeic and chlorogenic acids.

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Translated from Khimiya Prirodnykh Soedinenii, No. 4, p. 524, July-August, 1982. Original article submitted March 29, 1982.

0009-3130/82/1804-0496$07.50