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FLAVONOIDS OF *Astragalus levieri* AND *A. sevangensis*

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Continuing an investigation of plants of the genus *Astragalus*, family Fabaceae [1], we have studied the chemical composition of two species: *Astragalus levieri* Freyn O. B. L. (Levier's milk vetch) and *Astragalus sevangensis* Grossh., belonging to the section *Onobrychium* Bge. [2]. The plants were collected in the flowering period from the territory of Georgia and Armenia.

To obtain the total flavonoids, 200.0 g of the air-dry herbage of each plant was extracted with 70% ethanol in an apparatus of the Soxhlet type. The ethanolic extracts were evaporated to an aqueous residue and treated with chloroform. The purified aqueous extract was exhaustively reextracted with ethyl acetate, and the ethyl acetate extract was evaporated and the total flavonoids were precipitated with chloroform.

The individual compounds were isolated by preparative chromatography on Filtrak FN-3 paper in the BAW (4:1:5) and 15% CH_3COOH systems and by column chromatography on polyamide. From *A. levieri* six flavonoid compounds were isolated, and their chemical compositions were established.

Substance (1), $C_{27}H_{30}O_{16}\cdot 2H_2O$, mp 187-189°C (from ethanol), $[\alpha]_D^{20}$ −12.5° (c 0.68; methanol), λ_{max} 359, 363 nm, was characterized as quercetin 3-O-rutinoside (rutin) [3].

Substance (2), $C_{21}H_{20}O_{12}$, mp 232-235°C (from ethanol), $[\alpha]_D^{20}$ −60° (c 0.15; methanol), λ_{max} 259, 365 nm, was quercetin 3-O-β-D-galactopyranoside (hyperoside) [4].

Substance (3), $C_{21}H_{20}O_{11}$, mp 179-181°C (ethanol), $[\alpha]_D^{20}$ −69° (c 0.5; ethanol), λ_{max} 350, 266 nm, was kaempferol 3-glucoside (astragalin) [5].

Substance (4), $C_{15}H_{10}O_7$, mp 310-313°C (from methanol), λ_{max} 256, 370 nm, was characterized as quercetin [6].

Substance (5), $C_{33}H_{40}O_{19}$, mp 189-191°C, $[\alpha]_D^{20}$ −120.4° (pyridine–ethanol (1:1)), λ_{max} 350, 265 nm, was identified as robinin [7].

Substance (6), $C_{28}H_{32}O_{11}\cdot 2H_2O$, mp 180-182°C, $[\alpha]_D^{20}$ −32.2° (c 0.31; dimethylformamide), λ_{max} 354, 266 nm, consisted of narcissin [8].

From *A. sevangensis*, we isolated rutin, hyperoside, astragalin, and narcissin.

The structures of all the compounds isolated were confirmed by the results of elementary analysis, UV and IR spectroscopy, and the results of a study of the products of acid and alkaline hydrolyses, and also by comparison with authentic samples.

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FLAVONOIDS AND COUMARINS OF *Dictamnus dasycarpus*

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Psoralen and xanthotoxin have been isolated previously from *Dictamnus dasycarpus* Furcz. collected in the environs of the town of Khabarovsk [1]. In the present communication we give the results of a study of the epigeal part of this plant collected by the resource-prospecting division of the Combined Soviet–Mongolian Complex Biological Expedition in the Eastern Aimak (Khamar-Daba somoch) in 1973 during the fruit-bearing period.

To isolate the flavonoids and coumarins, the comminuted raw material was extracted with a tenfold amount of 80% ethanol. The extract was evaporated to eliminate the solvent, and the residue was mixed with distilled water, 1:1. The precipitate that deposited was filtered off, and the filtrate was treated successively with chloroform and ethyl acetate. Then the solvents were evaporated off in vacuum and the residues were subjected to column chromatography.

On separation of the residue from the chloroform extract with the aid of partition chromatography on silica gel (with formamide as the mobile phase), the column was washed with petroleum ether–benzene (8:2), and then with chloroform. This gave furocoumarins: psoralen ($C_{11}H_6O_3$, mp 161-163°C); xanthotoxin ($C_{12}H_8O_4$, mp 145-146°C); and the hydroxycoumarin scopoletin ($C_{10}H_8O_4$, mp 200-202°C).

The residue from the ethyl acetate extract was separated on a column of polyamide sorbent. The column was washed with chloroform and with mixtures of chloroform and ethanol with increasing concentrations of the latter of from 5 to 20%. This led to the isolation of quercetin ($C_{15}H_{10}O_7$, mp 308-310°C) and of quercetin 3-O-β-D-glucopyranoside (isoquercetrin, $C_{21}H_{20}O_{12}$, mp 218-222°C, $[\alpha]_D^{20}$ −39°C (methanol)).

After the treatment of the aqueous phase with the solvents mentioned above and evaporation of the aqueous phase to a small residue, crystals of rutin (quercetin 3-O-β-rutinoside, $C_{27}H_{30}O_{16}$) deposited, with mp 188-192°C, $[\alpha]_D^{20}$ −29° (dimethylformamide).

The substances were identified from their physicochemical properties, R_f values in various solvent systems, the results of UV and IR spectroscopy, and mixed melting points with authentic samples.

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