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FLAVONOIDS OF THE ROOTS OF *Verbascum songoricum*

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Plants of the genus *Verbascum* L. (fam. Scrophulariaceae) are a rich source of flavonoids and saponins, some of which are used in folk medicine as anesthetic and wound-healing agents in the treatment of burns and tumors, in toothache and inflammation of the eyes, and as an expectorant in chronic coughing [1].

We give results of a study of the flavonoids of roots of *V. songoricum* Schrenk gathered in August, 1989, in the Talas range (Tamdybulak), Republic of Kyrgyzstan [2]. An alcoholic extract of the comminuted air-dry raw material was concentrated in vacuum, diluted with water, and extracted successively with chloroform, ethyl acetate, and *n*-butanol.

Chromatography of the ethyl acetate fraction on a column of silica gel in a gradient chloroform—methanol system led to the isolation of compounds (**1**)-(**5**).

Apigenin (1) (4′,5,7-trihydroxyflavone) — $C_{15}H_{10}O_5$ (M^+ 270), mp 347-348°, λ_{max} 270, 311 nm [3].

Luteolin (2) (3′,4′,5,7-tetrahydroxyflavone) — $C_{15}H_{10}O_6$ (M^+ 286), mp, 328-331° (decomp.), λ_{max} 260, 274, 356 nm [3, 4].

Quercetin (3) (3,3′,4′,5,7-pentahydroxyflavone) — $C_{15}H_{10}O_7$ (M^+ 302), mp 313-315°, λ_{max} 257, 268, 371 nm.

The PMR spectrum (in Py-d_5) showed the signals of protons at 6.56 (d, 2.5 Hz, H-6), 6.63 (d, 2.5 Hz, H-8), 7.24 (d, 8.5 Hz, H-5′), 7.94 (dd, 8.5 and 2.5 Hz, H-6′), 8.47 (d, 2.5 Hz, H-2′).

The acetylation of quercetin with acetic anhydride in the presence of pyridine led to the pentaacetate with mp 191-193°C, while methylation with dimethyl sulfate in the presence of potash gave the pentamethyl ether with mp 121-122°C, M^+ 372 [3, 4].

Cynaroside (4) (luteolin 7-β-*D*-glucopyranoside) — $C_{21}H_{20}O_{11}$, mp 240-242° (decomp.), λ_{max} 256, 268, 350 nm.

Its PMR spectrum (in Py-d_5) showed the signals of protons at 3.90-4.05 (protons of the sugar moiety), 5.66 (d, 7.0 Hz, H-1′), 6.67 (d, 2.5 Hz, H-6), 6.77 (s, H-3), 6.84 (d, 2.5 Hz, H-8), 7.13 (d, 8.0 Hz, H-5′), 7.38 (dd, 8.0 and 2.5 Hz, H-6′), 7.74 (d, 2.5 Hz, H-2′).

The acid hydrolysis of glycoside (**4**) gave luteolin and *D*-glucose. The acetylation of substance (**4**) with acetic anhydride in pyridine gave a heptaacetate derivative with the composition $C_{35}H_{34}O_{18}$ (M^+ 942), mp 121-123°C [4].

Daucosterol (5) — substance with the composition $C_{35}H_{60}O_6$, mp 314-317°C. Acid hydrolysis yielded β-sitosterol and *D*-glucose.

This is the first time that compounds (**1**)-(**5**) have been isolated from *V. songoricum*.

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