FLAVONOIDS OF Thermopsis alterniflora

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We have studied the flavonoid composition of the herb Thermopsis alterniflora Rgl. et Schmalh. (family Leguminosae) collected in the flowering period in 1971 in the environs of the village of Sidzhak, Tashkent oblast.

By the two-dimensional chromatography on paper of an ethanolic extract in the BAW (4 : 1 : 5) and 15% acetic acid systems, the presence of three substances of flavonoid nature was detected. In order to study them, the raw material was extracted with 70% methanol, and the extract was concentrated, diluted with water, and shaken with benzene. Concentration of the benzene extract gave flavonoid (I) with mp 262-263°C, which was shown by Bryant's reaction to be an aglycone.

A methanolic extract, after purification with benzene, was transferred to a column of polyamide sorbent. Elution with 20-40% methanol gave two crystalline flavonoid glycosides – (II) with mp 276-279°C and (III) with mp 253-255°C.

The present communication gives the results of a physicochemical study of the flavonoid (III) with the composition $C_{21}H_{20}O_{10}$, mp 253-255°C, $[\alpha]_D^{25} - 36.2°$ (c 0.62; DMFA).

Its UV spectrum had a maximum at 262 nm (log ε 4.54) and its IR spectrum a band at 1663 cm^{-1} (C=O), which showed that it is an isoflavonoid. On the basis of the bathochromy of the long-wave maximum with diagnostic reagents, the presence of hydroxy groups in the 4' and 5 positions was established [1]. Acid hydrolysis gave an aglycone, $C_{15}H_{10}O_5$, mp 295-296°C (decomp.), yield 62%, and D-glucose, identified by paper chromatography and by the gas-liquid chromatography of its silyl ether. The aglycone was identified by its melting point and bathochromy as genistein. In the NMR spectrum of (III) taken in pyridine (on a JNM-4-H-100/100 MHz instrument), a one-proton singlet with δ 8.02 ppm corresponds to the H-2 protons; doublets at 7.54 and 7.15 ppm, J = 8.5 Hz (2H each), to the H-2', H-6' and H-3', H-5' protons; and singlets at 6.69 and 6.78 ppm to the H-6 and H-8 protons. A six-proton multiplet was observed in the 4-4.5-ppm region, which characterizes flavone (III) as a monoglucoside, and the chemical shift of the anomeric proton of δ 5.6 ppm shows the β configuration. This was also confirmed by the cleavage of (III) with emulsin and absorption bands at 990 and 890 cm^{-1} in the UV spectrum. Bands at 1090, 1065, and 1020 cm^{-1} show that the glucose has the pyranose form.

It follows from the bathochromic shifts of (III) and its aglycone that the glucose residue is located in position 7. Thus, flavonoid (III) is 7-O-β-D-glucopyranosyl-4',5-dihydroxyisoflavone (genistin). This was also confirmed by the value of $[M]_D \cdot K_{Ph}$ calculated by Klyne's method [2].

According to paper chromatography, the same flavonoids are present in the herb T. lanceolata L. The gas-liquid chromatography was performed by T. T. Gorovits.

LITERATURE CITED

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2. I. P. Kovalev and V. I. Litvinenko, Khim. Prirodn. Soedin., 233 (1965).

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