Chemistry of Natural Compounds, Vol. 29, No. 6, 1993

FLAVONOIDS OF THE EPIGEAL PART OF *Russowia sogdiana*

A. V. Butayarov, É. Kh. Batirov, M. M. Tadzhibaev, S. Melibaev, and V. M. Malikov

UDC 547.972

In order to find new sources of biologically active phenolic compounds, we have studied the flavonoids of the epigeal part of *Russowia sogdiana* (Bge). Fedtsch, fam. *Asteraceae*. *R. sogdiana* is an annual herbaceous plant 15—50 cm high. It is found on outcrops of variegated rocks in the low mountain zone of Cetral Asia [1]. The plant was gathered in the flowering period in the enviroms of Fergana.

The air-dry comminuted raw material (0.8 kg) was extracted with ethanol at room temperature four times. The concentrated extract was diluted with water and extracted successively with chloroform, ethyl acetate, and n-butanol. The ethyl acetate fraction (21.5 g) was chromatographed on a column of silica gel in a chloroform–isopropanol gradient system. Compounds (I-IV) were isolated. Chromatography of the butanol fraction (22.6 g) on silica gel in a chloroform–methanol gradient system led to the isolation of substance (V).

Flavonoids (I-V) were identified by a study of their UV, NMR (^1H and ^{13}C), and mass spectra. and also by the performance of some chemical transformations.

Quercetin (I). Substance with the composition $C_{15}H_{10}O_7$ (M^+ 302), mp 312-315°C, $\lambda_{max}^{ethanol}$ 257, 268, 372.

Quercetin 7-O-β-D-Glucopyranoside (II). Yellow crystalline substance with the composition $C_{21}H_{20}O_{12}$, mp 245-247°C, $\lambda_{max}^{ethanol}$ 257, 266, 374 nm. In the PMR spectrum (Py-d_5) there were the signals of protons at (ppm) 3.87-4.60 (glucose protons), 5.73 (d, 6.5 Hz, H-1″), 6.69 (d, 2.5 Hz, H-6), 6.91 (d, 2.5 Hz, H-8), 7.25 (d, 8.5 Hz, H-5′), 7.96 (dd, 2.5 and 8.5 Hz, H-6′) and 8.50 Hz (d, 2.5 Hz, H-2′). The acid hydrolysis of substance (II) led to the formation of quercetin and D-glucose. The position of attachment of the carbohydrate residue was established by a study of UV spectra taken with diagnostic additives [2, 3].

Isorhamnetin 7-O-β-D-glucopyranoside (III). Light yellow crystals with the composition $C_{22}H_{22}O_{12}$, mp 250-252°C, $\lambda_{max}^{ethanol}$ 255, 271, 327, 376 nm. The acid hydrolysis of glycoside (III) gave isorhamnetin (mp 305-307°C, M^+ 316, $\lambda_{max}^{ethanol}$ 256, 265, 373 nm) and D-glucose. The PMR spectrum of compound (III) contained signals at (ppm) 3.77 (s, $-OCH_3$), 3.90-4.57 (glucose protons), 5.70 (d, 6.5 Hz, H-1″), 6.72 (d, 2.5 Hz, H-6), 7.02 (d, 2.5 Hz, H-8), 7.24 (d, 8 Hz, H-5′), 8.08 (dd, 2.5 and 8.5 Hz, H-6′), 8.14 (br.s, H-2′), and 13.08 (br.s, 5-OH) [2, 3].

Saponaretin (IV). Light yellow substance with the composition $C_{21}H_{20}O_{10}$, mp 222-224°C, $\lambda_{max}^{ethanol}$ 272, 294*,339 nm. yThe resistance of the substance to acid hydrolysis and its PMR spectrum showed that it was a C-glycoside. The oxidation of glycoside (IV) with $FeCl_3$ solution gave apigenin and D-glucose. ^{13}C NMR spectrum in DMSO-d_6: 163.3(c-2), 102.9(C-3), 182.0(C-4), 156.4(C-5), 108.9(C-6), 163.7(C-7), 93.8(C-8), 161.2(C-9), 103.5(C-10), 121.3(C-1′), 128.3(C-2′, 6′), 116.1(C-3′, 5′), 160.6(C-4′), 73.2(C-1″), 70.5(C-2″, 4″), 78.9(C-3″), 81.3(C-5″), 61.4(C-6″). Consequently, compound (IV) was 6-C-β-D-glucopyranosylapigenin [2, 4, 5].

Vitexin (V). Light yellow crystalline substance with the composition $C_{21}H_{20}O_{10}$, mp 247-249°C, $\lambda_{max}^{ethanol}$ 285, 337 nm. PMR spectrum in Py-d_5: 4.05-4.55 (protons of the carbohydate moiety), 4.75 (t, 8 Hz, H-2″), 5.79 (d, 8 Hz, H-1″), 6.76 (s, H-3), 7.07 (d, 9 Hz, H-3′, 5′), 7.35 (s, H-6), 7.74 (d, 9 Hz, H-2′, 6′). The presence of hydroxy groups in positions 5, 7, and 4′ of the flavone nucleus was shown by UV spectroscopy. By a study of the products of oxidation with a solution of $FeCl_3$ and of spectral characteristics, flavonoid (V) was identified as 8-C-βD-glucopyranosylapigenin [2, 4].

This is the first time that the compounds described above have been isolated from *Russowia sogdiana*.

Institute of the Chemistry of Plant Substances, Uzbekistan Academy of Sciences, Tashkent. Translated from Khimiya Prirodnykh Soedinenii, No. 6, pp. 902-904, November-December, 1993. Original article submitted July 1, 1993.

0009-3130/93/2906-0807$12.50

REFERENCES

1. The Flora of Uzbekistan [in Russian], Izd. AN UzSSR, Tashkent, Vol. VI, (1962), p. 386.
2. T. J. Mabry, K. R. Markham, and M. B. Thomas, The Systematic Identification of Flavonoids, Springer, New York (1970).
3. T. K. Chumbalov, O. V. Fadeeva, and T. K. Nikishchenko, Khim. Prir. Soedin., 89 (1974).
4. Ngo-Bik-Khai and G. S. Glyzina, Khim. Prir. Soedin., 116 (1972).
5. K. Hostettmann and A. Jacot-Guillarmod, Helv. Chem. Acta, **59**, 1584 (1976).