FLAVONOIDS OF Biebersteinia multifida

V. B. Omurkamzinova, N. D. Maurel', and T. N. Bikbulatova

UDC 547.972

Biebersteinia multifida, family Geraniaceae J. St. Hil., is a perannual herbaceous plant. It is used in folk medicine as a hemostatic agent. There are reports of the value of this species as a technical and food raw material [1, 2]. Biebersteinia has been studied inadequately in the chemical respect. Saponins, tanning substances, alkaloids, and inulin have been detected in the herbage and roots. Polysaccharides have been isolated from the tuberous roots and have been characterized [3].

We have studied the flavonoids of the epigeal mass of B. multifida gathered in the foothills of the Trans-Ili Ala-Tau. After the raw material had been treated with benzene, the polyphenolic compounds were extracted with methanol. The extract obtained was concentrated in vacuum to a viscous residue, and this was diluted with water and was extracted successively with benzene and with ethyl acetate. Flavonoids 1 and 2 were isolated from the ethyl acetate fraction by chromatography on polyamide and on Sephadex LH-20, and flavonoid 3 was isolated from the aqueous residue. For their identification we used chemical transformations and UV and PMR spectroscopies.

Flavonoid 1, $C_{15}H_{10}O_6$, mp 330-332°C was identified as luteolin.

Flavonoid 2, $C_{21}H_{20}O_{11}$, mp 252-254°C (from ethanol), $[\alpha]_D^{24}$ −38.5° (c 0.5; methanol), $\lambda_{max}^{CH_3OH}$ 264, 348 nm.

Luteolin was isolated from the products of its hydrolysis, and D-glucose was characterized. The glycosidic nature of the substance was confirmed by its PMR spectrum (DMSO, δ, ppm), which showed the signals of the anomeric proton (5.07 ppm, d, J = 6 Hz) and of other protons of glucose (3.15-3.72 ppm). By a comparison of the physicochemical constants and the UV and PMR spectra of the substance isolated and those known for monoglucosides of luteolin, substance 2 was characterized as luteolin 7-O-β-D-glucopyranoside – cynaroside [4].

Flavonoid 3 formed spherical yellow crystals, mp 196-197°C (from aqueous alcohol), $\lambda_{max}^{CH_3OH}$ 265, 353 nm. On complete acid hydrolysis, it formed luteolin, glucose, and rhamnose. Cynaroside was isolated from the products of stagewise acid hydrolysis, and rhamnose was detected chromatographically. Spectral investigations in the UV region showed that the carbohydrate components were attached in the form of a biose in the C-7 position of luteolin. In the PMR spectrum, the signal of the anomeric proton of the β-glucose residue was located at 5.08 ppm (d, J = 6.5 Hz), that of the anomeric proton of the α-rhamnose residue at 4.54 ppm (s), and that of the CH_3 group of the rhamnose residue at 1.13 ppm (d, J = 6.5 Hz).

To determine the position of the bond between the sugar residues, we obtained the peracetate of flavonoid 3, and in its PMR spectrum ($CDCl_3$) the ratio of the signals of the glucose and rhamnose protons in the 4.5-5.4 and 3.65-4.1 ppm regions was 8:4, which is characteristic for rutinosides [5].

The results obtained permitted flavonoid 3 to be characterized as luteolin 7-O-β-rutinoside [6].

This is the first time that luteolin derivatives have been isolated from Biebersteinia.

LITERATURE CITED

1. D. Seidemetov, Author's Abstract of Dissertation for Candidate of Chemical Sciences [in Russian], Tashkent (1982).
2. D. Seidemetov, Uzb. Biol. Zh., No. 5, 53 (1987).

S. M. Kirov Kazakh State University, Alma-Ata. Translated from Khimiya Prirodnykh Soedinenii, No. 5, pp. 720-721, September-October, 1991. Original article submitted December 26, 1990; revision submitted May 6, 1991.

 0009-3130/91/2705-0636$12.50

3. A. O. Arifkhodzhaev, Kh. A. Arifkhodzhaev, and E. S. Kondratenko, Khim. Prir. Soedin., 755 (1985).
4. L. P. Smirnova, G. G. Zapesochnaya, and V. I. Sheichenko, Khim. Prir. Soedin., 786 (1983).
5. L. P. Smirnova, V. I. Glyzin, and A. V. Patudin, Khim. Prir. Soedin., 668 (1974).
6. L. S. Teslov, Khim. Prir. Soedin., 390 (1976).

FLAVONOIDS OF Oxytropis strobilacea

Sompkhon Pkhon-asa

UDC 547.972

Continuing an investigation of the flavonoids of plants of the genus Oxytropis DC. growing in Transbaikalia, we have studied the epigeal part of O. strobilacea DC., family Fabaceae, gathered in the flowering–beginning of fruit-bearing phase in the Buryat ASSR.

The air-dry comminuted raw material was exhaustively extracted successively with 40%, 70%, and 96% ethyl alcohols. The extract was evaporated in vacuum and chromatographed on column of polyamide sorbent.

Four flavonoid compounds were isolated, of which two proved to be aglycons and two glycosides.

The flavonoids isolated were identified on the basis of the melting points of the pure substances and mixed melting points, the products of acid hydrolysis and alkaline degradation, and IR and UV spectra [1, 2].

Substance (I), $C_{15}H_{10}O_7$, mp 308-310°C (60% ethanol), $\lambda_{max}^{ethanol}$ 256, 372 nm, was identified as quercetin.

Substance (II), $C_{16}H_{12}O_7$, mp 285-286°C (60% ethanol), $\lambda_{max}^{ethanol}$ 258, 374 nm, was identified as rhamnetin.

Substance (III), $C_{27}H_{30}O_{16}$, mp 190-192°C (40% ethanol), $\lambda_{max}^{ethanol}$ 258, 361 nm, was identified as quercetin 3-O-β-rutinoside (rutin).

Substance (IV), $C_{22}H_{22}O_{10}$, mp 217-219°C (70% ethanol), $\lambda_{max}^{ethanol}$ 258, 359 nm, was identified as rhamnetin 3-O-β-D-glucoside.

LITERATURE CITED

1. L. K. Klyshev, V. A. Bandyukova, and L. S. Alyukina, Plant Flavonoids [in Russian], Nauka, Alma-Ata (1978).
2. E. Wollenweber, in: The Flavonoids: Advances in Research, J. B. Harborne and T. J. Mabry (eds.), Chapman and Hall, London (1982), pp. 189-253.

Leningrad Institute of Pharmaceutical Chemistry. Translated from Khimiya Prirodnykh Soedinenii, No. 5, p. 721, September-October, 1991. Original article submitted December 27, 1990.

0009-3130/91/2705-0637$12.50