C_2H_5OH: 268, 326 nm. Acid hydrolysis (3% HCl, 6 h) led to the formation of acacetin and D-glucose; $[\alpha]_D^{20}$ − 64.5°. According to PMR spectroscopy, the substance was a monoside. We have characterized it as acacetin 7-O-β-D-glucopyranoside (tilianin).

Substance (VI) consisted of light yellow crystals with mp 265°C. UV spectrum, λ_{max} CH_3OH: 270, 330 nm. Acid hydrolysis gave acacetin, D-glucose, and L-rhamnose. From its R_f value and melting point it corresponded to acacetin 7-rutinoside (linarin) which has been isolated from Cirsium oleraceum.

LITERATURE CITED

1. V. A. Bandyukova and A. Boikova, Khim Prir. Soedin., 596 (1969).
2. H. Rösler, T. J. Mabry, M. F. Cranmer, and J. Kagan, J. Org. Chem., 30, 4346 (1965).

FLAVONOIDS OF SOME SPECIES OF SAINFOIN FROM THE CENTRAL ASIAN FLORA

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The results of a preliminary chromatographic study of the epigeal part of seven species of the genus Onobrychis (sainfoin) family Fabaceae (Leguminosae), which is widespread in the territory of Central Asia, has shown that they are rich in flavonoid compounds and, in particular, quercetin, kaempferol, and isorhamnetin derivatives (+, appreciable amount of the substance; ++, considerable amount; ±, small amount; − absence of the given substance):

Glycosides	O. cornuta	O. echidna	O. fergana	O. grandis	O. arenaria	O. chorassanica	O. serawschanica
Quercetin:							
3-rhamnopyranoside	++	±	±	+	±	±	±
3-glucopyranoside	++	+	+	++	±	++	++
3-galactopyranoside	++	++	++	++	+	++	++
3-rutinoside	++	++	++	++	−	++	±
7-glucopyranoside	±	−	−	−	−	−	−
Kaempferol:							
3-glucopyranoside	+	+	+	−	+	+	−
3-rutinoside	±	±	−	±	−	−	−
Isorhamnetin:							
3-galactofuranoside	−	±	−	±	−	±	±

Paper chromatography was performed in the presence of authentic samples of the corresponding substances in the 15% acetic acid and n-butanol–acetic acid–water (4:1:5) solvent systems.

The species Onobrychis grandis Lipsky was subjected to a more profound chemical study for flavonoids. The isolation and purification of the total flavonoids was carried out by a known method [1].

With the aid of column chromatography on polyamide with elution by ethanol–water in various ratios six individual substances (I-VI) were isolated from O. grandis and were identified.

Substance (I) – mp 184-186°C, $[\alpha]_D^{20}$ −28.0° (c 0.11; ethanol); UV spectrum $\lambda_{max}^{C_2H_5OH}$ 355, 257 nm.

Substance (II) – mp 231-233°C, $[\alpha]_D^{20}$ −36.4° (c 1.08; dimethylformamide); UV spectrum, $\lambda_{max}^{C_2H_5OH}$: 361, 257 nm.

Substance (III) – mp 189-190°C, $[\alpha]_D^{20}$ −31.5° (c 0.32; dimethylformamide); UV spectrum, $\lambda_{max}^{C_2H_5OH}$: 354, 256 nm.

Substance (IV) – mp 177-179°C, $[\alpha]_D^{20}$ −6.5° (c 0.50; ethanol); UV spectrum, $\lambda_{max}^{C_2H_5OH}$: 355, 268 nm.

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Substance (V) – mp 218-224°C, $[\alpha]_D^{20}$ – 28.0° (c 0,20 ; dimethylformamide); UV spectrum, $\lambda_{max}^{C_2H_5OH}$: 350, 264 nm.

Substance (VI) – mp 252-254°C, $[\alpha]_D^{20}$ – 59.0° (c 0,66 dimethylformamide); UV spectrum, $\lambda_{max}^{C_2H_5OH}$: 355, 254 nm.

A comparison of the results of acid and enzymatic hydrolyses and of the UV, IR, and PMR spectra of these substances with those given in the literature [2], and also the absence of depressions of the melting points of mixtures with authentic samples permitted the glycosides isolated to be identified as quercitrin (I), hyperoside (II), rutin (III), astragalin (IV), kaempferol 3-rutinoside (V) and isorhamnetin 3-galactofuranoside (VI).

LITERATURE CITED

1. M. S. Luk'yanchikov, Khim. Prir. Soedin., 256 (1982).
2. L. K. Klyshev, V. A. Bandyukova, and L. S. Alyukina, Plant Flavonoids [in Russian], Alma-Ata (1978).

FLAVONOIDS OF SPECIES OF THE GENUS Campanula

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Continuing an investigation of the flavonoid composition of plants of the genus Campanula L. [1], we have made a chromatographic study of nine species belonging to the subsection Symphyandriformes (Fom.) Fed. [2]. Four species were studied in more detail: Campanula ossetica Bieb. (Ossetia, Digoria), Campanula kolenatiana C.A. Mey, ex Rupr. (Azerbaidzhan, Vartashern region, village of Bash-Dashagyl), C. Kemulariae Fomin. (Georgia, Imeretinskii massif), and C. choziatowskyi Fomin. (Armenia, Daralagez, village of Gnishik) which we collected during the flowering period. Ethanolic extracts from the epigeal parts of these species were concentrated, treated with hot water, and purified with chloroform, and the total flavonoids were extracted with ethyl acetate and were then precipitated with dry chloroform. The total flavonoids from each species were deposited on a column of polyamide sorbent and were eluted with water and with ethanol of various concentrations [3], as a result of which the following individual substances were isolated:

1. Cynaroside (luteolin 7-O-β-glucoside) mp 254-256°C (from aqueous methanol),, $[\alpha]_D^{20}$ – 50° (c 0.1; methanol). $\lambda_{max}^{CH_3OH}$ 255, 266, 348 nm. The acetyl derivative had mp 237-240°C. Isolated from the flowers and leaves of C. ossetica;

2. Hyperoside (quercetin 3-O-D-galactoside), mp 232-235°C (from acetone–ethanol, 1:1), $[\alpha]_D^{20}$ –58.97° (c 0.1; ethanol). $\lambda_{max}^{CH_3OH}$ 257, 230, 362 nm. The acetyl derivative had mp 108-110°C (from acqueous acetone) [4];

3. Isoquercitrin (quercetin 3-O-D-glucoside), mp 220-222°C (from ethanol), $[\alpha]_D^{20}$ –20.5° (c 0.6; methanol). $\lambda_{max}^{CH_3OH}$ 255, 263, 362 nm [5]. Substances 2 and 3 were isolated from the herbage of C. kolenatiana and C. kemulariae; and

4. Rutin (quercetin 3-rutinoside), mp 185-186°C (from ethanol); $[\alpha]_D^{20}$ – 32° (c 0.054; ethanol); $\lambda_{max}^{C_2H_5OH}$ 258, 365 nm). This was isolated from the herbage of C. choziatowskyi.

The structures of the compounds isolated were shown on the basis of UV- and IR-spectral analysis and physicochemical properties [4].

It was established by paper chromatography that cynaroside was present in species of the Finitimae Fed. group: C. ossetica; hyperoside and isoquercitrin in species of the Raddeana Fed. group: C. raddeana Trautv. (Somkhetiya, village of Atshuri), C. betulifolia (Adzharia, gorge of the R. Chorokh), C. kolenatiana and C. kemulariae Fomin (Transcaucasia, from various populations), and rutin – from species of the Bayernianae Fed. group: C. choziatowskyi

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