POLYPHENOLIC COMPOUNDS OF Astragalus karakuschensis

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Continuing an investigation of plants of the genus Astragalus, we have studied the chemical composition of the epigeal part of A. karakuschensis Gontsch., collected in the flowering period in the environs of the village of Gnishik (Daralagez Range, Armenian SSR) for the presence of polyphenolic compounds.

The isolation and purification of the total polyphenolic substances was carried out by a known method [1] with the subsequent deposition of the combined material on a column of polyamide sorbent. The column was eluted with mixtures of water and ethanol with increasing concentrations of the latter. Nine compounds were obtained in the individual form, and these were recrystallized from ethanol and aqueous ethanolic solutions.

Substance I – $C_{21}H_{20}O_{11}$, mp 178–180°C, $[\alpha]_D^{20}$ –56.8° (c 0.1; ethanol); λ_{max} 350, 265 nm. After hydrolysis of the substance with 5% H_2SO_4, D-glucose and kaempferol were detected in the hydrolyzate by paper chromatography. Substance (I) was identified as astragalin [2].

Substance (II) – $C_{21}H_{20}O_{12}$, mp 237–238°C; $[\alpha]_D^{20}$ –58.0° (c 0.1; methanol); λ_{max} 360, 258 nm.

From the products of acid hydrolysis we isolated an aglycon with the composition $C_{15}H_{10}O_7$ (nm, 310–312°), identical with quercetin, and D-galactose. From the results of acid and enzymatic hydrolysis and a chromatographic investigation, and from the absence of a depression of the melting point in a mixture with an authentic sample, substance (II) was identified as quercetin 3-O-β-D-galactopyranoside (hyperoside) [3].

Substance (III) – $C_{27}H_{30}O_{16}$, mp, 186–188°C (aqueous ethanol); $[\alpha]_D^{20}$ –32.4° (c, 0.2; methanol); λ_{max} 365, 260 nm.

When the substance was hydrolyzed under mild conditions (1% sulfuric acid in the water bath for 30 min), quercetin and rutinose were detected in the hydrolysates. Consequently, (II) was quercetin 3-O-[O-β-D-glucopyranosyl-(6 → 1)-α-L-rhamnopyranoside] (rutin) [4].

Substance (IV) – $C_{33}H_{40}O_{19}$, mp, 190–191°C (aqueous ethanol); $[\alpha]_D^{20}$ –120.4° (pyridine–ethanol); λ_{max} 350, 264 nm. A mixture of the glycoside and an authentic sample of robinin gave no depression of the melting point; consequently, substance (IV) was robinin [3].

Substance (V) – $C_{22}H_{22}O_{12}$, mp, 172–174°C (from aqueous ethanol), $[\alpha]_D^{20}$ –30° (c 0.4; methanol); λ_{max} 359, 267, 256 nm.

Acid hydrolysis gave an aglycon identical with isorhamnetin and D-glucose, which was identified by PC. Qualitative reactions and UV spectra with diagnostic additives permitted substance (V) to be identified as isorhamnetin 3-O-β-D-glucopyranoside [5].

Substance (VI) – $C_{21}H_{20}O_{12}$, mp, 234–236°C; $[\alpha]_D^{20}$ –69.1° (c, 0.1; methanol); λ_{max} 361, 255 nm.

Acid hydrolysis formed quercetin and D-glucose. The UV spectrum of the glycoside with ionizing and complex-forming reagents showed that the sugar in the glycoside under investigation was present at C_3 of the flavonoid aglycon, and it was possible to identify the glycoside isolated as quercetin 3-O-β-D-glucopyranoside [4, 9].

Substances (VI)-(IX) gave a positive reaction for hydroxycinnamic acids [8, 7].

A comparison of the chromatographic mobilities, differentiating coloration with a stabilized diazonium salt, the results of elementary analysis, and UV spectra, and also a

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comparison with authentic samples permitted the acids isolated to be identified as known ones: caffeic, $C_9H_8O_4$, ferulic, $C_{10}H_{10}O_4$, and p-hydroxybenzoic, $C_7H_6O_3$ [6, 8].

Biological trials showed that the sum of the polyphenolic compounds from A. karakuschensis caused a more considerable lowering of the arterial pressure in experiments on animals than an officinal preparation of papaverine hydrochloride.

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