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FLAVONOIDS OF *Glycine hispida*

V. N. Kovalev and L. M. Seraya

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We have previously reported the isolation of 48 flavonoids and phenolic carboxylic acids from the epigeal part of *Glycine hispida* (Moench) Maxim. (ordinary or hispid soybean) of the Kievskaya variety [1]. Continuing the chemical study of this plant, we have isolated eight glycosides (X-XVII) from ethyl acetate and n-butanolic extracts by chromatography on columns of polyamide and silica gel. The structures of the compounds have been established on the basis of the results of a study of the products of acid, alkaline, and enzymatic hydrolysis, UV, IR, and PMR spectroscopy, and a comparison with authentic samples.

Substance (X) — $C_{21}H_{20}O_9$, mp 233-235°C $[\alpha]_D$ −34.4° (methanol), UV spectrum: λ_{max} 265, 365 nm — was identified as 4',7-dihydroxyisoflavone 7-O-β-D-glucopyranoside (daidzin) [2].

Substance (XI) — $C_{21}H_{20}O_{10}$, mp 253-255°C, $[\alpha]_D$ −25.6° (methanol); UV spectrum: λ_{max} 260, 325 nm. From its IR and PMR spectra it was identical with 4',5,7-trihydroxyisoflavone 7-O-β-D-glucopyranoside (genistin) [2].

Substance (XII) — $C_{22}H_{22}O_9$, mp 210-212°C, $[\alpha]_D$ −26.2° (methanol); UV spectrum, λ_{max} 255 nm. Analysis of the products of the hydrolysis, acetylation, and demethylation of the aglycone, and the absence of a depression of a mixed melting point permitted substance (XII) to be characterized as 7-hydroxy-4'-methoxyisoflavone 7-O-β-D-glucopyranoside (ononin) [2].

Substances (XIII) — $C_{21}H_{20}O_{11}$, mp 178-180°C, $[\alpha]_D$ −16° (methanol) — and (XIV) — $C_{21}H_{20}O_{12}$, mp 218-220°C, $[\alpha]_D$ −39° (methanol) — gave D-glucose and the aglycones kaempferol and quercetin, respectively, on acid hydrolysis. UV spectra with the addition of ionizing reagents, and also PMR spectra showed, in each case, the attachment of the D-glucose residue to the 3-OH group of the aglycone (the anomeric proton gave a doublet in the 5.97-ppm region). Thus, compound (XIII) was kaempferol 3-O-β-D-glucopyranoside (astragalin), and (XIV) was quercetin 3-O-β-D-glucopyranoside (isoquercetrin) [3].

Substance (XV) — $C_{27}H_{30}O_{16}$, mp 188-190°C, $[\alpha]_D$ −29° (DMFA) — was identified on the basis of chemical transformations and the products of acid and enzymatic hydrolysis, spectral characteristics, and the results of a comparison with an authentic sample as quercetin 3-O-rutinoside (rutin) [3].

Substance (XVI) — $C_{27}H_{30}O_{15}$, mp 220-222°C. UV spectrum: λ_{max} 365, 347 nm. Kaempferol, D-glucose, and L-rhamnose were detected in the products of alkaline hydrolysis. Kaempferol and rutinose were found among the products of enzymatic hydrolysis. On the basis of the facts given above and PMR-spectral characteristics, compound (XVI) was identified as kaempferol 3-O-rutinoside [4].

Substance (XVII) — $C_{27}H_{30}O_{17}$, mp 198-200°C. UV spectrum: λ_{max} 265, 355 nm. Quantitative acid hydrolysis showed the presence in the molecule of two glucose residues and of the aglycone quercetin. The oxidation of (XVII) by Chandler's method [4] followed by the paper chromatography of the biose split out and visualization with specific reagents permitted the assumption of the existence of a 1→2 bond between the D-glucose residues. On the basis of the facts given, substance (XVII) was characterized as quercetin 3-O-sophoroside [3].

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FLAVONOIDS OF *Astragalus lagurus*

N. N. Guzhva, A. L. Kazakov,
S. F. Dzhumyrko, and L. S. Sarkisov

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The epigeal part of *Astragalus lagurus* collected in the Krasnosel'sk region of the Armenian SSR on the shores of Lake Sevan was exhaustively extracted with 70% ethanol. The ethanolic extract was concentrated in vacuum to an aqueous residue, and this was treated with chloroform to eliminate ballast substances. The combined flavonoids were extracted from the purified aqueous residue with ethyl acetate and were precipitated with chloroform. To isolate individual phenolic compounds, the total flavonoids were deposited on a column containing polyamide sorbent and were eluted successively with water and ethanol in various concentrations, and the individual fractions were obtained by preparative paper chromatography. Seven flavonoid compounds were obtained in the individual state.

Substance (1) — $C_{21}H_{20}O_{11}$, mp 178-180°C, $[\alpha]_D^{20}$ −69° (c 0.5; ethanol), λ_{max} 350, 267 nm. Acid hydrolysis (5% H_2SO_4) gave an aglycone $C_{15}H_{10}O_6$ with mp 273-275°C, λ_{max} 265, 270 nm. The results of a spectral and physicochemical investigation enabled the aglycone to be identified as kaempferol. D-Glucose was detected in the hydrolysate by paper chromatography. This substance was kaempferol 3-glucoside (astragalin) [1].

Substance (2) — $C_{21}H_{20}O_{12}$, mp 237-238°C (from ethanol), $[\alpha]_D^{20}$ −60° (c 0.15; methanol), λ_{max} 259, 365 nm. As the result of acid hydrolysis, an aglycone with mp 307-309°C, identical with quercetin, and D-galactose were found. When this substance was mixed with an authentic sample of crystalline hyperoside no depression of the melting point was observed. Consequently, the substance consisted of quercetin 3-O-β-D-galactopyranoside (hyperoside) [2].

Substance (3) — $C_{21}H_{20}O_{11}$, mp 191-193°C, λ_{max} 359, 255 nm, $[\alpha]_D^{20}$ −45° (c 0.1; methanol). Acid hydrolysis yielded kaempferol. D-Galactose was identified in the hydrolysate by paper chromatography. This substance was kaempferol 3-O-β-D-galactopyranoside (trifolin) [3].

Substance (4) — $C_{21}H_{20}O_{12}\cdot 2H_2O$, mp 236-238°C, $[\alpha]_D^{20}$ −80.9° (c 0.1; methanol). On acid hydrolysis with 2% H_2SO_4, the substance split into quercetin and D-glucose. Spectral investigations in the UV region showed that the glucose was attached to the aglycone in the third position. The results obtained give grounds for considering the substance to be quercetin 3-O-β-D-glucopyranoside (isoquercitrin) [4].

Substance (5) — $C_{21}H_{20}O_{11}$, mp 267-268°C, $[\alpha]^{20}$ −48° (c 0.14; methanol), λ_{max} 365, 265 nm. Kaempferol and D-glucose were detected in the products of acid hydrolysis. The substance gave no depression of the melting point with an authentic sample of populin and it was therefore kaempferol 7-glucoside (populin) [5].

Substance (6) — $C_{21}H_{20}O_{11}$, mp 243-245°C, λ_{max} 369, 259 nm. On acid hydrolysis, quercetin was detected. The carbohydrate moiety consisted of D-glucose. According to its physical properties, hydrolysis products, and UV spectra, the substance was identical with quercimeritrin (3,3',4',5,7-pentahydroxyflavone 7-O-β-D-glucopyranoside) [6].

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