cutin formed 3,5-dihydroxycinnamic acid with mp 243-245°C [2] and the known hexadecyl alcohol with the composition $C_{16}H_{33}OH$ (amorphous).

Fractions 17-23 yielded a third ester, with the composition $C_{10}H_{10}O_4$, mp 162-163°C, M^+ 194, R_f 0.35. Its saponification also formed 3,5-dihydroxycinnamic acid with mp 243-245°C. In view of the composition of the substance, it may be concluded that it is the methyl ester of the above-mentioned acid. This was confirmed by its physicochemical constants and NMR spectrum which contained a three-proton singlet at 3.62 ppm. The substances isolated from the *Cascuta lehmanniana* have not been detected in the elm.

LITERATURE CITED

1. Y. Volmar and O. Thurkauf, J. Pharm. Chim., 10, 201; (1928).
2. Y. Asahina and T. Matsuzaki, J. Pharm. Soc. Jpn., No. 2, 509 (1924); 1713 (1965); Chem. Abstr. 19 (1925).

THE STRUCTURE OF A FLAVONOID GLYCOSIDE FROM *Filipendula ulmaria*

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UDC 547.972

In an investigation of the flora of the Belorussian SSR for its flavonoid content, we have found a high concentration of these compounds in the leaves of *Filipendula ulmaria* L. Maxim. (European meadowsweet).

Ethanolic extracts yielded the main flavonoid component with mp 207-210°C, mp of the acetate 122-125°C, λ_{max} 254, 266 shoulder, 368 nm, $[\alpha]_D^{20}$ −63.5° (c 0.33; methanol). The main absorption maxima in the UV region — short-wave (254 nm) and long-wave (368 nm) — are within the limits characteristic for the absorption of a flavonol nucleus [1]. The compound isolated is a flavonol glycoside, as is shown by Bryant's cyanidin reaction [2]. On acid hydrolysis, it split into glucose and quercetin (308-309°C, acetate with mp 181-185°C, UV and NMR spectra).

The NMR spectrum of the substance contained, in addition to the signals corresponding to quercetin, a doublet at 5.02 ppm, 1H, J = 7 Hz, representing the signal of the β-anomeric proton of glucose. The six glucose protons were represented by signals in the 3.2-3.8 ppm region. A comparison of the specific rotation of the glycoside isolated with those of known flavonoid β-monoglucosides [3] showed the pyranose form of the glucose ring.

Two quercetin monoglucosides are known with the D-glucose residue in position 3 — isoquercitrin [4, 5, 6] and hirsutrin [7], one with it in position 7 — quercimeritrin [8, 9] and one with it in position 4' — spiraeoside [10]. The compound that we isolated does not correspond to any of the compounds mentioned above with respect to R_f values, melting point of the acetate, and characteristics of its UV, IR, and NMR spectra. The lemon-yellow fluorescence of the substance on chromatograms in UV light suggests the presence of the carbohydrate substituent in position 3', 4', or 7. However, on the basis of UV spectra (λ_{max} 254, 266 sh., 368 nm; +NaOAc 277, 390 nm; + NaOAc + H_3BO_3 254, 269, 370 nm; + $AlCl_3$ 263, 426 nm; + $AlCl_3$ + HCl 259, 426 nm; + NaOMe 279, 420 nm) the compound isolated has free hydroxy groups in positions 3, 4', 5, 7. Consequently, the only possible remaining position for the glucose is position 3'.

On the basis of the experimental results, the glucoside from the flowers of European meadowsweet has the structure of 3'-β-D-glucopyranosyloxy-3,4',5,7-tetrahydroxyflavone.

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LITERATURE CITED

1. V. I. Litvinenko and N. P. Maksyutina, Khim. Prirodn. Soedin., 420 (1965).
2. E. E. Bryant, J. Am. Pharm. Assoc. Sci., 39, 480 (1950).
3. I. P. Kovalev and V. I. Litvinenko, Khim. Prirodn. Soedin., 233 (1965).
4. T. K. Chumbalov, G. M. Nurgalieva, and R. A. Abdykalykova, Khim. Prirodn. Soedin., 243 (1972).
5. R. Paris and P. Belaveuer, Compt. Rend., No. 10, 1510 (1961).
6. I. M. Mukhamed'yarova, Khim. Prirodn. Soedin., 131 (1968).
7. Z. P. Pakudina and Ya. S. Sadykov, Khim. Prirodn. Soedin., 98 (1967).
8. T. A. Geissman, J. Org. Chem., 22, 946 (1957).
9. T. S. Zurabishvili, Khim. Prirodn. Soedin., 253 (1974).
10. T. A. Geissman, The Chemistry of Flavonoid Compounds, Pergamon Press, New York (1962), p. 338.

FLAVONOIDS OF *Genista transcaucasica*

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Genista transcaucasica Schischk, family Leguminosae, was collected in the Lachin region of the Azerbaidzhan SSSR in May-June in the flowering period and in August in the fruit-bearing period. In the chemical respect, this species has acarcely been studied. We have investigated the flavonoids of the epigeal part, the flowering apical part of the plant, and the roots separately.

The total amount of flavonoids in the flowering apical part of the plant was the highest, amounting to 2.7%.

The combined flavonoids were obtained by extraction of the raw material with 70% alcohol. The extract was evaporated in vacuum to an aqueous residue, which was purified with petroleum ether and was then reextracted with ethyl acetate–n-propanol (4:1) until the reaction for flavonoids was negative. The combined extracts were evaporated in vacuum, and the residue was diluted with a small amount of water. This material was separated by adsorption column chromatography on a polyamide sorbent and by preparative chromatography.

For a preliminary investigation of the qualitative composition of the aglycones of the flavonoid compounds, the raw material investigated, an extract from it, and also the combined flavonoids were subjected to acid hydrolysis. It was found that the aglycones of the flavonoids were luteolin and apigenin.

From the combined flavonoids we obtained five individual compounds, one of which consisted of an aglycone while four were of glycosidic nature (Bryant's test). Color reactions, the colors of the spots on chromatograms in visible and UV light, comparison with "markers," and spectroscopic investigations with the aid of ionizing and complex-forming additives [1], and also acid hydrolysis followed by identification of the aglycones and carbohydrate substituents, determinations of melting points and of mixed melting points with presumed authentic samples showed that individual compounds had been obtained. The configurations of the glycosidic bonds were determined by enzymatic hydrolysis and by polarimetric analysis [2-4].

On the basis of the investigations performed, of the five substances isolated one was identified as the aglycone luteolin and the others as glycosides of luteolin and of apigenin — cynaroside, apigenin 7-O-β-D-glucopyranoside, and scolimoside, while the fifth substance has provisionally been identified as isorhoifolin.

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