LITERATURE CITED

1. G. S. Glyzina, Conference on Questions of the Study and Utilization of the Plant Resources of the USSR [in Russian], Novosibirsk (1968), p. 48.
2. G. S. Glyzina, Materials for a Scientific Conference on the Pharmacology of Natural Drugs [in Russian], Khabarovsk (1967), p. 26.
3. G. S. Glyzina, and V. I. Bykov, Khim. Prir. Soedin., 322 (1969).
4. L. Hörhammer, L. Stich, and H. Wagner, Naturwissenschaften, 46, 358 (1959).
5. A. Masakazu, and T. Kawasaki, Tetrahedron Lett., 12, 941 (1969).
6. S. Useda, Bull. Chem. Soc. Jpn., 6, 30 (1957).
7. E. C. Bate-Smith and J. B. Harborne, Nature (London), 198, 4887 (1963).

POLYPHENOLIC COMPOUNDS OF POTATO FLOWERS

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In folk medicine, the flowers of the potato (*Solanum tuberosum* L.) have been used since antiquity as an antipyretic agent in diseases of the liver and kidneys, and in cases of constipation and tumors [1-3].

We have investigated the flowers of potatoes of the variety "Rozovyi rannii" ["early pink"] gathered in the Novo-Vodolazhskii Region of Khar'kov province.

The comminuted flowers were extracted with a fivefold volume of 80% ethanol with steeping for 24 h (three times) at room temperature. The combined extracts were evaporated in vacuum to small volume and centrifuged, and the resinous precipitate that had deposited was filtered off. After a day, an amorphous precipitate giving no reaction for flavonoids deposited from the extract obtained. Chromatography on paper in systems 1) butan-1-ol—acetic acid—water (4:1:2) and 2) 15% acetic acid showed the presence in the purified extract of not less than 9 substances of phenolic nature. In the products of the acid hydrolysis of the extract (5% ethanolic solution of hydrochloric acid, on the boiling water bath for 4 h), we found kaempferol, quercetin, myricetin, luteolin, and caffeic acid.

When the purified extract was stored in the refrigerator (5-6°C) a precipitate was formed of a substance in the form of pale yellow needles with the composition $C_{21}H_{20}O_{11}$, mp 256-258°C, $[\alpha]_D^{20}$ −100.0°. UV spectrum: λ_{max} 257, 268, 350 nm (substance (I)).

Chromatography on polyamide columns with elution by 30% ethanol gave a compound consisting of light yellow acicular crystals with the composition $C_{27}H_{30}O_{16}$, mp 191-193°C, $[\alpha]_D^{20}$ −32.0°. UV spectrum: λ_{max} 258, 264, 362 nm (substance (II)).

When using as eluent chloroform—ethanol (9:1), a substance was isolated in the form of yellow acicular crystals with the composition $C_{21}H_{20}O_{12}$, mp 229-231°C, $[\alpha]_D^{20}$ −33.0°. UV spectrum: λ_{max} 258, 264, 360 nm (substance (III)), and on elution with water heated to 40°C, we obtained a compound with the composition $C_{16}H_{18}O_9$, mp 202-204°C $[\alpha]_D^{20}$ −31.9°. UV spectrum: λ_{max} 240, 328 nm (substance (IV)).

On the basis of the results of a chemical investigation of the compounds obtained and of the products of their hydrolysis, and also of a comparison with authentic samples, substance (I) was identified as luteolin 7-O-β-D-glucopyranoside (cynaroside); (II) as quercitin 3-[O-α-L-rhamnopyranosyl-(1→6)-β-D-glucopyranoside] (rutin); (III) as quercetin 3-O-β-D-glucopyranoside (isoquercitrin); and (IV) as 5-O-caffeyl-D-quinic (chlorogenic) acid.

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0009-3130/83/1905-0613$07.50

LITERATURE CITED

1. N. Annenkov, Botanical Dictionary [in Russian], St. Petersburg (1878), p. 211.
2. N. Z. Umikov, Fruits, Berries, Vegetables, Cereals, and Spices [in Russian], Tbilisi (1953), p. 85.
3. A. B. Nikolaev, Some Information on the Use of Medicinal Plants in Folk Medicine [in Russian], Moscow (1972), p. 28.

AN APIGENIN GLUCURONIDE FROM *Leucanthemum vulgare*

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We have previously reported the different flavonoid compositions of the ligulate and tubular flowers of *Leucanthemum vulgare* Lam. [1, 2].

Continuing a study of the chemical composition of the ligulate flowers, we have isolated another individual flavonoid — pale yellow crystals with the compositions $C_{21}H_{18}O_{11}$, mp 320-323°C (decomp.), $[\alpha]_D^{28}$ −92.0 (c 0.6 pyridine–water (1:1)); molecular mass 446.4. UV spectrum $\lambda_{max}^{C_2H_5OH}$ 336, 270 nm; (+NaOAc) 336, 270 nm; (+$AlCl_3$) 380, 285 nm; (+$AlCl_3$ + HCl) 336, 270 nm; (+NaOMe) 400, 276 nm. The IR spectrum had an intense absorption band at 1725 cm^{-1} (C=O group of an acid).

The glycoside was hydrolyzed with 10% H_2SO_4 for 5 h. This formed 68% of an aglycone with the composition $C_{15}H_{10}O_5$, mp 349-351°C. UV spectrum $\lambda_{max}^{C_2H_5OH}$ 336, 269 nm; (+NaOAc) 380, 274 nm; (+$AlCl_3$) 380, 275 nm; (+$AlCl_3$ + HCl) 336, 269 nm; (+NaOMe) 400, 275 nm. Phloroglucinol and p-hydroxybenzoic acid were found in the products of alkaline fusion. The aglycone was characterized as 4',5,7-trihydroxyflavone — apigenin [1-3].

The glycoside was hydrolyzed by the enzyme β-glucuronidase [4].

D-Glucuronic acid* was detected in the aqueous fractions of the acid and enzymatic hydrolysates by PC analysis.

A comparison of the physicochemical constants of the glycoside under investigation and an authentic sample of apigenin 7-O-β-D-glucuronide, together with literature information [5-7], showed their identity.

The results of the chemical study were confirmed by those of NMR spectroscopy in a comparative analysis of the aglycone, the glycoside itself, and an authentic sample.

Thus, the compound isolated has been characterized as apigenin 7-O-β-D-glucosiduronic acid.

LITERATURE CITED

1. T. G. Sagareishvili, M. D. Alaniya, and É. P. Kemertelidze, Khim. Prir. Soedin, 567 (1980).
2. T. G. Sagareishvili, M. D. Alaniya, V. S. Kikoladze, and É. P. Kemertelidze, Khim. Prir. Soedin., 442 (1982).
3. M. D. Alaniya, N. F. Komissarenko, and É. P. Kemertelidze, Khim. Prir. Soedin., 527 (1971).
4. S. P. Colowick and N. O. Kaplan, Methods Enzymol., 1, 262 (1955).
5. H. Wagner, H. Danninger, M. A. Iyengar, O. Seligmann, L. Farkas, S. S. Subramanian, and A. G. R. Nair, Chem. Ber., 104, 2681 (1971).

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