When the mother liquor from lactone (I) was rechromatographed on a column of silica gel with elution by benzene–acetone (30:1), crystals of the lactone (II), $C_{15}H_{18}O_5$, were isolated with mp 249-250°C (benzene–acetone), M^+ 278 $[\alpha]D^{20}$ +26.5° (c 2.17; ethanol).

The IR spectrum of (II) had absorption bands of a hydroxy group (3440 cm^{-1}), of a γ-lactone carbonyl (1742 cm^{-1}), and of a double bond (1663 cm^{-1}).

The mass spectra of lactones (I) and (II) each contained a characteristic ion with m/z 111 (100%), showing the presence of two epoxide groups in the five-membered ring of a guanine skeleton [2]. The lactone (II) was dientified as chrysartemin B by driect comparison of IR spectra [3].

The PMR spectrum of (I) contained the following signals; singlets at 1.11 and 1.51 ppm of 3 H each (methyl groups at a carbon linked to an oxygen fraction); a doublet of 1 H at 2.67 ppm (proton at C_5, J = 11 Hz); two singlets at 3.19 and 3.38 ppm of 1 H each (gem-epoxide protons); a multiplet of 1 H at 3.86 ppm (proton at C_7); a triplet of 1 H at 4.42 ppm (lactone proton, ^3J = 11 Hz); two doublets of 1 H each at 5.23 and 6.04 ppm (the protons of an exomethylene group at a lactone ring, J = 3 Hz); and a singlet of 1 H at 6.84 ppm (the proton of a tertiary OH group).

Lactone (I) was identified as canin on the basis of the results of a comparison of PMR spectra, characteristics of its mass spectrum, and also its $[\alpha]_D$ value [4].

Fractions 98-106 of the eluates, on standing, deposite crystals of a lactone (III) with the composition $C_{15}H_{20}O_4$, mp 204-205°C (chloroform–acetone), M+ 264. Its IR spectrum contained absorption bands of a hydroxy group (3350 cm^{-1}), of a γ-lactone carbonyl (1764 cm^{-1}), and of double bonds (1645 and 1670 cm^{-1}). Lactone (III) was identified as isoridentin by a direct comparison of IR spectra [5].

LITERATURE CITED

1. P. P. Polyakov, Flora of the USSR [in Russian], Vol. 26, Moscow (1961), p. 451.
2. M. A. Irwin and T. A. Geissman, Phytochemistry, 12, 863 (1973).
3. T. Osawa, D. Taylor, A. Suzuki, and S. Tamura, Tetrahedron Lett., 13, 1169 (1972).
4. H. Voshioka, T. Mabry, and B. Timmerman, Sesquiterpene Lactones, University of Tokyo Press (1973), p. 1.
5. M. I. Yusupov, Sh. Z. Kasymov, N. D. Abdullaev, G. P. Sidyakin, and M. R. Yagudaev, Khim. Prir. Soedin., 800 (1977).

FLAVONOIDS OF *Artemisia cina*

T. V. Ryakhovskaya and O. A. Sapko

UDC 547.972

Two flavonoids have been isolated previously from *Artemisia cina* Berg. ex Poljak. (levant wormwood): transilin (7O-β-D-glucopyranosyloxy-3-O-methylquercetin) and vicenin-1 (apigenin 6,8-di-C-β-D-glucopyranoside) [1].

Aqueous ethanol (40%) eluted substance (I), $C_{16}H_{12}O_6$, yellow crystals with mp 265-268°C; $\lambda_{max}^{C_2H_5OH}$ 274, 337 nm (log ε 4.45, 4.64); 295, 375 nm (+$AlCl_3$ + HCl); 274, 337 nm (+H_3BO_3); 279, 357 (+CH_3COONa); 297, 389 nm (+$ZrOCl_2$); 274, 337 nm (+$ZrOCl_2$ + citric acid). IR spectrum (cm^{-1}): 2900-3200 (–OH); 1670 (C=O); 1610 (C=C); 2960 (–OCH_3). Alkaline cleavage led to the formation of p-hydroxybenzoic acid, showing the presence of a free 4'-OH group. PMR spectrum of the acetate of substance (I) ($CDCl_3$, δ, ppm): 7.75 (d, J = 8.0 Hz, H-2', 6'); 7.12 (d, J = 8.0 Hz, H-3', 5'); 7.20 (s, H-8); 6.50 (s, H-3). The signals of three acetyl groups were located in the 2.2-2.5 ppm region: 2.50 (5-CH_3COO); 2.26 (4'-CH_3COO); 2.21 (CH_3COO-7). An OCH_3 group revealed itself in the 3.75 ppm region [2].

On the basis of the results obtained, substance (I) was identified as 4',5,7-trihydroxy-6-methoxyflavone (hispidulin). Hispidulin has not previously been detected in wormwoods.

Institute of Molecular Biology and Biochemistry, Academy of Sciences of the Kazakh SSR, Alma-Ata.

Translated from Khimiya Prirodnykh Soedinenii, No. 3, pp. 406-407, May-June, 1985. Original article submitted December 7, 1983.

0009-3130/85/2103-0380$09.50

Chromatography of the ethyl acetate extract on a column of polyamide yielded substances (II)-(IV). Substance (II) – $C_{15}H_{10}O_7$, mp 308-310°C; $\gamma_{max}^{C_2H_5OH}$: 256, 270 nm. Substances (III) – $C_{27}H_{30}O_{16}$, mp 187-190°C, $\lambda_{max}^{C_2H_5OH}$:256, 354 nm; on acid hydrlolysis quercetin, glucose, and rhamnose were detected. Substance (IV) – $C_9H_8O_4$, mp 194°C: $\lambda_{max}^{C_2H_5OH}$: 328, 302 sh., 240 nm.

The results of the physicochemical investigation [3], and also a comparison of the substances isolated with authentic samples permitted them to be characterized as quercetin, rutin, and caffeic acid, respectively.

LITERATURE CITED

1. G. P. Baltabaev, Questions of the Metabolism of Cultivated Plants [in Russian], Alma-Ata (1972), p. 58.
2. T. J. Mabry, K. R. Markham, and M. B. Thomas, The Systematic Identification of Flavonoids, Springer, New York (1970).
3. V. I. Litvinenko and N. P. Maksyutina, Khim. Prir. Soedin., 420 (1965).

FLAVONOIDS OF *Artemisia sublessingiana*

T. V. Ryakhovskaya, A. M. Manadilova, and O. A. Sapko

UDC 547.972

We have investigated the epigeal part of *Artemisia sublessingiana* (Kell.) Krasch. ex Poljak. collected during the flowering period in the environs of the town of Uzun-Agach (Alma-Ata province).

To extract the flavonoids, the air-dry raw material was treated with ethanol. The extracts were combined, concentrated, diluted with water, and filtered. The filtrate was treated successively with benzene, chloroform, and ethyl acetate. The aqueous fraction was separated on a column of polyamide. Aqueous ethanol (20%) eluted substance (I) – $C_{28}H_{32}O_{18}$, mp 176-178°C (aqueous ethanol); $\lambda_{max}^{C_2H_5OH}$ 256, 358 nm (log ε 4.94, 4.88). The results of UV spectroscopy with diagnostic additives and the products of alkaline cleavage characterized substance (I) as a flavonol with a substituted 3-OH group and with free OH groups in positions 4', 5, and 7 and an OCH_3 group in position 3'.

Acid hydrolysis gave an aglycone and two sugars: glucose and rhamnose. IR spectrum (cm^{-1}): 3600-3300 (OH); 1600 (C=O); 1610 (C=C); 2940 (OCH_3). NMR spectra for substance I (pyridine) and its acetate ($CDCl_3$) confirmed the presence in it of one OCH_3 group, three OH groups, and free H-2', -5', -6', -6, and -8 protons [1].

The structure of the carbohydrate moiety of the substance was deduced from the PMR spectrum of its acetate. The spectrum of the acetate of substance (I) contained signals of the anomeric protons of rhmnose at 4.56 ppm (s) and of glucose at 5.40 ppm (d, J = 7 Hz), which are characteristic for the pyranose forms of these sugars. The signal of the terminal group of rhamnose was detected in the 0.95 ppm region (d, J = 6 Hz). Such signals of rhamnose (0.95 and 4.56 ppm) are characteristic of it in rutinosides [2].

Integration of the regions of appearance of the signals of the protons of the sugar residues at 3.1-3.8 and 4.7 and 5.5 ppm gave a ratio of 4:8, which also permitted compound (I) to be assigned to the rutinosides [2-4].

On the basis of the results obtained, the substance isolated was identified as 3'-methoxy-3-[Oα-L-rhamnopyranosyl)-(1 → 6)- β-D-glucopyranosyloxy]4',5,7-trihydroxyflavone (isorhamnetin 3-O-rutinoside). This compound has been isolated from the wormwoods *A. absinthium* and *A. vulgaris* [5].

When the benzene fraction was separated on polyamide with 30% aqueous ethanol, substance (II), $C_{17}H_{14}O_7$, mp 223-225°C, $\lambda_{max}^{C_2H_5OH}$ 273, 342 nm, was eluted. The substance was identified by UV, IR, and PMR spectroscopy and also on the basis of the products of alkaline cleavage

Institute of Molecular Biology and Biochemistry, Academy of Sciences of the Kazakh SSR, Alma-Ata.

Translated from Khimiya Prirodnykh Soedinenii, No. 3, pp. 407, May-June, 1985. Original article submitted December 7, 1983.

0009-3130/85/2103-0381$09.50