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STILBENES AND COUMARINS FROM THE PLANT *Polygonatum polyanthemum*

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In continuation of the search for biologically active compounds in plants of the flora of Georgia, we studied the chemical composition of *Polygonatum* (Convallariaceae) [1].

Herein we studied rhizomes and radical stems of *P. polyanthemum* (Bieb.) A. Dietr collected in May–June in the vicinity of Kodzhori and Saguramo (Georgia).

Raw material (400 g, air-dried ground roots) were extracted with MeOH (80%, 3×) for 1 h at reflux. The solvent was distilled off. The remaining aqueous phase was worked up with hexane to remove lipophilic substances and then extracted successively with $CHCl_3$, EtOAc, and *n*-BuOH. After the solvents were removed, the EtOAc and BuOH extracts that contained stilbenes were combined and chromatographed over a column of Sephadex LH-20 with elution by H_2O:MeOH with increasing alcohol content. This produced eight fractions. Fractions containing stilbenes were combined and rechromatographed over an analogous column with elution by EtOH to afford two pure compounds **1** (0.078 g, 0.019% calculated per raw material mass) and **2** (0.110 g, 0.027%).

The $CHCl_3$ extract was separated by distribution chromatography over a column of silica gel with elution first by Et_2O:C_6H_6 (8:2) and then $CHCl_3$ to afford **3** (0.098 g, 0.024%) and **4** (0.79 g, 0.019%).

Compound 1, $C_{15}H_{14}O_5$, $[M]^+$ 274, oily liquid. IR spectrum (KBr, ν_{max}, cm^{-1}): 3360 (OH), 3005, 2850, 1580, 1520, 1440 (aromatic), 1150 (C–O), 860, 845 (substituted rings), 680 (*cis*-bonded CH=CH). UV spectrum (EtOH, λ_{max}, nm, log ε): 225 (4.1) and 292 (3.41); +NaOEt, bathochromic shift to 242 and 308, respectively. PMR spectrum [300 MHz, $(CD_3)_2CO$, δ, ppm]: 8.47 (2H, s, 2 × OH), 8.14 (2H, s, 2 × OH), 6.58 (2H, s, CH=CH), 6.47 (5H, m, aromatic protons), 3.82 (3H, s, OMe). A comparison of the spectral data with the literature [2] identified **1** as *cis*-3,5,3′,5′-tetrahydroxy-4-methoxystilbene.

Compound 2, $C_{15}H_{14}O_5$, $[M]^+$ 274, colorless crystals, mp 167–169°C. IR spectrum (KBr, ν_{max}, cm^{-1}): 3270 (OH), 3005, 2840, 1620, 1595, 1520, 1430 (aromatic), 1160 (C–O), 980 (*trans*-bonded CH=CH), 835, 675 (substituted rings). UV spectrum (EtOH, λ_{max}, nm, log ε): 305 (3.51) and 315 (3.61); +NaOEt, bathochromic shift to 310 and 320, respectively. PMR spectrum [300 MHz, $(CD_3)_2CO$, δ, ppm, J/Hz): 8.26 (2H, br.s, 2 × OH), 7.97 (2H, br.s, 2 × OH), 6.86 (2H, s, CH=CH), 6.62 (2H, s, H-2, H-6), 6.56 (2H, d, J = 1.9, H-2′, H-6′), 6.32 (1H, t, J = 1.9, H-4′), 3.85 (3H, s, OMe). A comparison of the spectral data with the literature [2] identified **2** as *trans*-3,5,3′,5′-tetrahydroxy-4-methoxystilbene.

Compound 3. Umbelliferone (7-hydroxycoumarin), $C_9H_6O_3$, $[M]^+$ 162, colorless prisms or needles, mp 234–235°C. UV spectrum (EtOH, λ_{max}, nm): 320, 255. IR spectrum (KBr, ν_{max}, cm^{-1}): 3300 (OH), 1720 (γ-pyrone), 1614, 1571, 1520 (C=C) [3]. PMR spectrum (300 MHz, DMSO-d_6, δ, ppm, J/Hz): 7.92 (1H, d, J = 9.0, H-4), 7.52 (1H, d, J = 8.0, H-5), 6.82 (1H, dd, J = 8.0, 2.0, H-6), 6.72 (1H, d, J = 2.0, H-8), 6.20 (1H, d, J = 9.0, H-3) [3, 4].

Compound 4. Scopoletin (6-methoxy-7-hydroxycoumarin), $C_{10}H_8O_4$, $[M]^+$ 192, colorless or yellowish crystals, mp 202–204°C. UV spectrum (MeOH, λ_{max}, nm): 233, 255, 295, 347. IR spectrum (KBr, ν_{max}, cm^{-1}): 3349 (OH), 3047, 1712–1705 (α-pyrone C=O), 1650, 1611, 1572 (C=C), 2932 (OCH_3) [3]. PMR spectrum (300 MHz, $CDCl_3$, δ, pm, J/Hz): 7.20 (1H, s, H-8), 6.82 (1H, s, H-5), 6.19 (1H, d, J = 9.0, H-3), 3.90 (3H, s, 6-OCH_3) [3].

All compounds were isolated for the first time from *P. polyanthemum*.

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