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PHENOLIC COMPOUNDS FROM *Oenothera gigas*

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We studied the composition of polyphenols from evening primrose (*Oenothera gigas* L.), which belongs to the Onagraceae family. About 120 species of *Oenothera* are known. The chemical composition of 60 of these has been studied. Tanning agents [1], flavonols [2], phenolcarboxylic acids and anthocyans [3], carbohydrates [4, 5], and others have been found in them. Extracts of these plants are used in folk medicine to cure several ailments of the heart and tuberculosis. Aqueous extracts possess antibacterial and wound-healing activity.

Oenothera gigas L. is cultivated mainly as a decorative. Treatment of the ground plant parts with $CHCl_3$ and aqueous acetone, concentration of the aqueous acetone extract under vacuum, treatment of the aqueous concentrate with ethylacetate, evaporation of the ethylacetate extract under vacuum, addition of four times the volume of hexane to the concentrated extract, and filtration of the resulting solids yielded phenolic compounds. Yield 4.2% of the aerial portion, 8.1% of the roots, and 5.3% of the flowers.

Two-dimensional paper chromatography using 1-butanol—CH_3CO_2H—H_2O (40:12:28, BAW) and 6% CH_3CO_2H confirmed that there are eight polyphenols from the aerial portion of the plant, six from the roots, and nine from the flowers. The total polyphenols of the aerial portion were chromatographed on a column with bare powder as a preliminary separation. The eluents were diethylether, water, acetone, and aqueous acetone.

Paper chromatography of the resulting fractions established that the ether fraction contains one; the water fraction, five (mainly flavonols and their glycosides), and the aqueous acetone, two hydrolyzed tanning agents. A white crystalline precipitate formed (**1**) after evaporation of the ether fraction under vacuum, dissolution of the solid in a small volume of hot water, and cooling.

Phenolic compounds in the aqueous fraction were separated by column chromatography using polyamide. The eluent was $CHCl_3$—CH_3OH with a gradient of increasing CH_3OH concentration. Several fractions containing pure compounds (**2-6**) were obtained, purified, and recrystallized.

Two compounds (**7** and **8**) were isolated by chromatography on silica gel of the aqueous—acetone fraction using diethylether—ethylacetate and pure ethylacetate.

Compound 1; white crystals, mp 220-222°C, R_f 0.51 (BAW, 4:1:5), upper phase; 0.41 (2% CH_3CO_2H). Identical to gallic acid.

Compound 2; finely crystalline light-yellow powder, mp 279-280°C, λ_{max} 366 and 266 (ethanol), alkaline cleavage by KOH forms phloroglucin and *p*-hydroxybenzoic acid. Identical to kaempferol.

Compound 3; finely crystalline yellow powder, mp 308-309°C, λ_{max} 373 and 257 (ethanol), alkaline cleavage by KOH forms phloroglucin and protocatechoic acid. Identical to quercetin.

Compound 4; light-yellow crystals, mp 175-176°C, $[\alpha]_D^{20}$ -69° (*c* 2.0, ethanol), λ_{max} 360 and 265 nm (ethanol), acid hydrolysis forms kaempferol and glucose. Identical to kaempferol-3-O-glucoside (astragalin).

Compound 5; yellow crystals, mp 184-185°C, $[\alpha]_D^{20}$ -20° (*c* 0.2, ethanol), λ_{max} 350 and 256 nm (ethanol). Identical with quercetin-3-O-rhamnoside (quercitrin).

Compound 6; light-yellow crystals, mp 234-235°C, $[\alpha]_D^{20}$ -59° (*c* 0.5, ethanol), λ_{max} 360 and 259 nm (ethanol). Identical to quercetin-3-O-galactoside (hyperoside).

Compound 7; colorless crystals, mp 202-203°C, $[\alpha]_D^{20}$ +48.1° (*c* 0.40, methanol), acid hydrolysis produces gallic acid

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and glucose in a 3:1 ratio. Identical to 1,4,6-tri-O-galloyl-β-D-glucose.

Compound 8; white amorphous powder, mp 208-210°C, $[\alpha]_D^{20}$ -8° (*c* 0.46, methanol). Acid hydrolysis produces gallic and ellagoic acids and glucose in a 1:1:1 ratio. Identical to 1-O-galloyl-4,6-hexahydroxydibenzoyl-β-D-glucose.

In contrast with polyphenols of the aerial portion, those of the roots did not contain astragalin and hyperoside. The flowers contained cyanidin and delphinidin and their 3-glucosides in addition to the flavonols and their glycosides that were isolated from the aerial portion.

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