

# FUROCUMARINS OF THE ROOTS OF HERACLEUM STEVENII AND H. VILLOSA

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We have studied the coumarin composition of the roots of two species of cowparsnip—H. stevenii Manden and H. villosa sp. from the villosa group collected in the region of the village of Shuntuk (Krasnodar territory).

The combined coumarins were isolated from the roots and then separated into individual substances on alumina as described previously [1].

As a result, from the cowparsnip species mentioned, we isolated and identified the following furocoumarins: pimpinellin (mp 118–119° C,  $C_{13}H_{10}O_5$ ), isopimpinellin (mp 148–150° C,  $C_{13}H_{10}O_5$ ), bergapten (mp 188–191° C,  $C_{12}H_8O_4$ ), isobergapten (mp 221–223° C,  $C_{12}H_8O_4$ ), and sphondin (mp 190–191° C,  $C_{12}H_8O_4$ ).

From H. stevenii, in addition to the substances mentioned, we isolated angelicin (mp 139–140° C,  $C_{11}H_6O_3$ ), and from H. villosa xanthotoxin (mp 145–146° C,  $C_{12}H_8O_4$ ).

## REFERENCE

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# A STUDY OF THE COUMARIN COMPOSITION OF THE ROOTS OF PRANGOS ULOPTERA

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In the present paper, we give the results of a study of the coumarin composition of the roots of Prangos uloptera D.C., collected in the Bichenak mountains of the Nakhichevan Autonomous Soviet Socialist Republic.

The roots (12 kg) were exhaustively extracted with chloroform. The solvent was distilled off in vacuum, and the residue (670 g of resin) was chromatographed on a column of alumina (activity grade III). Elution was carried out with petroleum ether, a mixture of petroleum ether and chloroform, chloroform, and methanol. The rechromatography of the crystalline mixture obtained and repeated recrystallization from suitable solvents led to the isolation of seven substances of a coumarin nature.

From their composition, melting points, IR spectra, and mixed melting points, the compounds were shown to be identical with authentic samples of, respectively: osthole, isoimperatorin, oxypeucedanin, oxypeucedanin hydrate, pranferol, pranchimgin, and marmesin.

When the chloroform extract (9.97 g of resin) was chromatographed on a column of alumina (activity grade II), the following were isolated: osthole, isoimperatorin, oxypeucedanin hydrate, pranchimgin, and a substance with the composition  $C_{20}H_{24}O_6$  (I) and mp 139–140° C (from benzene);  $R_f$  0.19 ( $Al_2O_3$ , activity grade III, ethyl acetate).

Substance (I) exhibits the properties characteristic for a coumarin: it possesses a bright violet fluorescence in UV light and gives a color reaction with diazotized p-nitroaniline. The UV spectrum of (I):  $\lambda_{max}$  224, 252, 330, 334 m $\mu$  (log  $\epsilon$  3.71; 3.14; 3.63, respectively) and  $\lambda_{min}$  262 m $\mu$  (log  $\epsilon$  2.64) agrees with a furocoumarin structure. The deep minimum observed in the 260–270 m $\mu$  region is characteristic for 4',5'-dihydrofurocoumarins.

The IR spectrum of (I) has characteristic absorption bands at 3300 (OH), 1735 (CO of a  $\delta$ -lactone), 1622, 1565, 1505 (aromatic nucleus), 1382, 1362 (gem-dimethyl grouping), and 870  $cm^{-1}$  (furan ring). The UV and IR spectra of (I) are very similar to those of marmesin, which is a 4',5'-dihydrofurocoumarin.