UDC 547.814

FUROCOUMARINS OF THE FRUIT OF XANTHOGALUM (ANGELICA) TATIANAE

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Khimiya Prirodnykh Soedinenii, Vol. 5, No. 4, p. 318, 1969

In the fruit of Xanthogalum (Angelica) tatianae (Bordz.) Schischk., collected in the Gordzhomi region (Adjar ASSR) we have established the presence of 2.2% of lactones of the coumarin group consisting of a mixture of four substances with R_f 0.94, 0.87, 0.75, and 0.00. The mobile system was n-hexane–benzene–methanol (5 : 4 : 1) and the stationary phase was a 10% solution of formamide in methanol.

The concentration of a methanolic extract yielded lactone A, $C_{12}H_8O_4$, mp 188–189° C, R_f 0.87 (yield 0.82%), which, on the basis of its IR spectrum and a mixed melting point was identified as bergapten.

After the separation of the bergapten, the residual mother liquor was chromatographed on a column of acidic alumina, which gave a small additional amount of bergapten and three other crystalline lactones: B, $C_{16}H_{14}O_5$, mp 147–148.5° C, R_f 0.75; C, $C_{11}H_6O_4$, mp 264–265° C, R_f 0.17; and D, $C_{26}H_{50}O$, mp 139–140° C.

Lactones B and C were identified by their composition, constants, IR spectra, and mixed melting point tests as isooxypeucedanin and bergaptol, respectively.

According to paper chromatography, bergaptol was not present in the initial raw material and was obviously formed by the cleavage of the isooxypeucedanin on the alumina in the presence of benzene.

From its chemical properties, IR spectrum, and a mixed melting point, substance D was identified as β-sitosterol.

28 February 1969

All-Union Scientific-Research Institute for Medicinal Plants

UDC 547.814

LACTONES OF THE FRUIT OF ANGELICA URSINA

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Khimiya Prirodnykh Soedinenii, Vol. 5, No. 4, pp. 318–319, 1969

A number of coumarins and furocoumarins have been isolated previously from the roots of Angelica ursina (Rupr.) Regel et Schmalh. [1–3]. In view of the fact that the coumarin complex of the roots and fruit of plants of the family Umbelliferae may have different compositions, we have studied the lactones present in the fruits of Angelica ursina.

The comminuted fruit (4 kg) was extracted with 40 *l* of methanol and the extract was concentrated to small volume and treated with diethyl ether. The ethereal extract was distilled and the residue, consisting of a mixture of substances with R_f 0.90, 0.84, 0.63, and 0.0 [n-hexane–benzene–methanol (4 : 5 : 1) system, paper impregnated with a 10% solution of formamide in methanol], was chromatographed on a column of neutral alumina 22 cm high and 8 cm in diameter.

The column was eluted with a mixture of petroleum ether and benzene (9 : 1) and then with benzene and methanol. Three furocoumarins were obtained: $C_{16}H_{14}O_4$ with mp 102° C, R_f 0.90 (56 g) (1); $C_{16}H_{14}O_5$ with mp 105–107° C; R_f 0.72 (37 g) (2); and $C_{16}H_{14}O_5$ with mp 134° C, R_f 0.63.

According to the UV and IR spectra, all three lactones are 8-substituted derivatives of psoralen. By their IR spectra and mixed melting points, the lactones were identified as, respectively, imperatorin, prangenin, and isoprangenin.

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13 March 1969

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