

## PEUCEDANIN FROM THE ROOTS OF PEUCEDANUM LUXURIANS

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In a paper-chromatographic study of P. Luxurians Tamamsch, collected in Armenia between Idzhevan and Berd, we have established in it the presence of substances with the same  $R_f$  values as those in P. morisonii and similar species. By the method described previously [1], we have isolated from the roots of these plants a furocoumarin  $C_{15}H_{16}O_4$  with mp 99-101° C (from carbon tetrachloride) which was found by mixed melting point and IR spectrum to be identical with peucedanin. Yield about 3%.

Peucedanin has previously been found in five species of Umbelliferae [1-4] belonging, like P. luxurians, to the section Peucedanum [5]. The presence of this substance in the section Peucedanum can be regarded as its chemical characteristic.

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## FLAVONOIDS OF THE FRUIT OF SILYBUM MARIANUM

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Two flavonoid compounds have been isolated from the fruit of Silybum marianum (L) Gaertn., but their structure has not been definitively established at the present time [1, 2]. By means of two-dimensional paper chromatography, we have found about five compounds of a flavonoid nature in an ethanolic extract of the fruit. By using chromatography on a polyamide sorbent and cellulose, we have isolated two crystalline flavonoids, I and II, and one in the amorphous state, III.

Substance I, mp 234-237° C,  $[\alpha]_D^{22} + 34.5^\circ$  ( $c$  0.2; dimethylformamide; electric spectropolarimeter). UV spectrum:  $\lambda_{\max}$  288, (325);  $\lambda_{\max}^{CH_3COONa}$  288, 327;  $\lambda_{\max}^{H_3BO_3+CH_3COONa}$  288, 328;  $\lambda_{\max}^{C_2H_5ONa}$  255, (288), 325;  $\lambda_{\max}^{AlCl_3}$  (290), 315, 370  $m\mu$ ; IR spectrum: 1647 (C=O, joined by a hydrogen bond to the 5-OH and the 3-OH); 1170, 1070, and 1035 (C-O-H); 3300-3440 (phenolic and alcoholic OH groups)  $cm^{-1}$ . In the solvent systems 1) ethyl acetate-benzene-acetic acid (73:24.5:2.5) and 2) 25% acetic acid, I had  $R_f$  0.36 and 0.57, respectively. Red orange color reaction with sodium borohydride, crimson with cyanidin, crimson with zinc + HCl, and yellow with concentrated  $H_2SO_4$ . The acetyl derivative has mp 118-120° C. In many of its properties, the substance obtained is similar to substance  $E_6$  (silybin) previously obtained from S. marianum but differs from it in its optical activity and melting point [1, 2].

Substance II, mp 173-175° C,  $[\alpha]_D^{20} + 150^\circ$  ( $c$  0.2; dimethylformamide). UV spectrum:  $\lambda_{\max}$  288, (325);  $\lambda_{\max}^{C_2H_5ONa}$  245, 325;  $\lambda_{\max}^{CH_3COONa}$  (288), 325;  $\lambda_{\max}^{H_3BO_3+CH_3COONa}$  288 (325);  $\lambda_{\max}^{AlCl_3}$  (288), 315  $m\mu$ . IR spectrum: 1644 (OH in position 5 of a flavonoid); 1745 (C=O of an ester or a five-membered lactone); 3200-3300 (phenolic OH groups); 3460 (alcoholic OH groups)  $cm^{-1}$ . In system 1  $R_f$  0.63; in system 2,  $R_f$  0.51. Red orange color reaction with sodium borohydride, yellow with cyanidin, yellow with zinc + HCl, and dark red with concentrated  $H_2SO_4$ . The acetate has mp 182-185° C. II is identical with substance  $E_5$  previously isolated from S. marianum, but has a different melting point and optical activity.

Substance III. UV spectrum:  $\lambda_{\max}$  285, (340);  $\lambda_{\max}^{C_2H_5ONa}$  (295), 325;  $\lambda_{\max}^{CH_3COONa}$  288, (325);  $\lambda_{\max}^{H_3BO_3+CH_3COONa}$  288, 340;  $\lambda_{\max}^{AlCl_3}$  (280), 315  $m\mu$ . In system 1,  $R_f$  0.79; in system 2,  $R_f$  0.07. Orange color reaction with sodium borohydride,