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COUMARINS OF FERULA CASPICA

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In addition to two coumarin derivatives [1], we have isolated from the roots of Ferula caspica a substance with the composition $C_{24}H_{30}O_4$, mp $85^{\circ}-87^{\circ}C$, $[\alpha]_D^{20} -30^{\circ}$ (c 1.0; chloroform). The IR spectrum has absorption bands at 1730 cm^{-1} (C=O of a lactone), 1645 cm^{-1} (C=C of a lactone), 1615 , and 1512 cm^{-1} (C=C); the UV spectrum has an absorption maximum at $320\text{ m}\mu$ ($\log \epsilon 4.02$).

The spectra and the nature of the fluorescence in UV light, the qualitative color reactions, and the presence of lactone properties have enabled us to assign this compound to the coumarins. The coumarin was not saponified by alkali. Acid hydrolysis gave umbelliferone with mp $234^{\circ}-235^{\circ}C$, also characterized in the form of its methyl ether with mp $118^{\circ}-119^{\circ}C$ and its acetate with mp $140^{\circ}-141^{\circ}C$.

In a high vacuum ($t = 150^{\circ}-200^{\circ}C$, residual pressure 10^{-3} mm), the coumarin yielded umbelliferone and a yellowish oily residue giving a positive reaction with vanillin in an acid medium, which showed that the side chain split off was a farnesol derivative [2]. The presence of absorption bands in the IR spectrum of the coumarin at 2980, 1370, and 1450 cm^{-1} is characteristic for the methyl and methylene groups in a farnesyl radical.

On the basis of the empirical formulas and the difference in the molecular weights of the coumarin and umbelliferone, it was found that the side chain of the coumarin had the composition $C_{15}H_{24}O$, i.e., the farnesyl component is attached by a simple ether linkage to the C-7 coumarin nucleus.

Thus, it has been established that the coumarin is an ether of umbelliferone with the monocyclic form of farnesol and is identical with the previously known farnesiferol C [3]. This is the first time that farnesiferol C has been isolated from the roots of Ferula caspica.

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