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## COUMARINS OF *Angelica sachalinensis*

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The new coumarin sachalinin has previously been isolated from the roots of *Angelica sachalinensis* Maxim, family Umbelliferae; it is an optical isomer of the known discophoridin [2]. The high content of coumarins in the roots and fruit of the plant investigated induced us to study it further.

By chromatography on a column of silica gel we isolated another two coumarins from the roots of this plant.

The first coumarin (I) with the composition  $C_{21}H_{20}O_7$ , mp 131-132°C,  $[\alpha]_D^{20} - 41^\circ$  (in chloroform) proved to be a diester of khellactone, and on the basis of its physicochemical constants and IR and NMR spectra it was identified as isopteryxin.

The second coumarin (II),  $C_{14}H_{12}O_3$ , mp 104°C, is soluble in organic solvents. It gives the characteristic reactions for coumarins (lactone test, diazo reaction). Its UV spectrum has a maximum at 328 nm ( $\log \epsilon$  4.11), which is characteristic for the chromophore of 7-hydroxycoumarin. The presence of small maxima at 250 and 262 nm ( $\log \epsilon$  3.50 and 4.0, respectively) enabled us to assign it to the dihydrofuro- and dihydropyrano coumarins. The IR spectrum contained maxima at ( $cm^{-1}$ ) 1740 (carbonyl), 1620, and 1585 (aromatic nucleus). The NMR spectrum contained a quadruplet at 7.54 and 6.10 ppm,  $J = 9.5$  Hz (H-4, H-3), and doublets at 7.21 and 6.65 ppm,  $J = 8.5$  Hz (H-6, H-5).

These facts show that substance (II) is a 7,8-disubstituted coumarin. A two-proton sextet with its center at 3.22 ppm is due to the methylene protons at an unsubstituted carbon atom of a dihydrofuran ring and a triplet at 5.25 ppm,  $J = 9$  Hz, to a methine proton of the same ring.

The substituent in the furan ring is an isopropylene group, which appears in the form of a three-proton singlet at 1.7 ppm (methyl on a double bond) and one-proton doublets at 5.0 and 4.86 ppm,  $J = 2.5$  Hz—vinyl protons.

On the basis of the facts presented, it may be concluded that (II) has the structure of 2'-isopropenyl-2', 3'-dihydrofuro-4',5':8,7-coumarin—angenomalin.

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