LACTONES OF Artemisia scoparia

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We have investigated Artemisia scoparia W. et K. growing in Uzbekistan and in southern Kazakhstan for its lactone content.

From a petroleum ether extract of the flower heads collected in July (Chimkent oblast), we isolated a coumarin – scoparone [1] (0.25% of the weight of the dry plant); from a petroleum ether extract of the leaves and buds collected in July (Tashkent oblast) we isolated a hydrocarbon with mp 79-80°C (0.126% of the weight of the dry plant).

The mother liquor was chromatographed on alumina (neutral, activity grade III-IV, 57 : 1). Elution was performed with petroleum ether, giving a colored crystallizing oil the UV spectrum of which showed the presence of polyynes in it (λ_{max} 230-235, 238-240, 245, 250, 256, and 340-346 nm) [2]. The oil was rechromatographed in silica gel (47 : 1). On elution with petroleum ether, the zones fluorescing bluish-yellow in UV light deposited faintly colored crystals with the composition $C_{13}H_{10}O_2$ (0.016% of the weight of the dry plant) with mp 122-123°C (petroleum ether), λ_{max} 230, 241, 256, 265, 275, 326 nm; ν_{max} 1730 cm^{-1} (CO), 1660 cm^{-1} (C=C), 1605, 1570, and 1485 cm^{-1} (arom.). The melting point and the IR and UV spectra were similar to those for the isocoumarin capillarin isolated previously from the epigeal part of A. capillaris and from the roots of Chrysanthemum trutescens L. [3, 4]. The hydrogenation of capillarin by Adams' method in ethanolic solution gave tetrahydrocapillarin, which proved to be identical with the dihydro derivative of artemidin [5].

A chloroform extract of the roots collected in July (Tashkent oblast) after chromatographic purification on alumina (acidic, activity grade III, 60 : 1) and then on silica gel (50 : 1), gave a lactone with mp 146-148°C (ether) exhibiting a bluish-gray fluorescence in UV light. Thin-layer chromatography on silica gel G [toluene–ethyl acetate (10 : 1)] gave a single spot with R_f 0.01-0.02, ν_{max} 3440 cm^{-1} (OH), 1720 cm^{-1} (CO), 1618 cm^{-1} (C=C), 1578, 1512, 1460 1420 cm^{-1} (arom.); λ_{max}, nm, 213, 226-235 (shoulder), 325.

From the combined methanolic extractive substances of the roots collected in June (Chimkent oblast) we obtained an ether-insoluble fraction which was treated with 10% caustic potash in methanol and, after standing for 24 h and acidification, was extracted with ether. The ethereal extract was chromatographed twice on silica gel (30 : 1 and 40 : 1). An ethereal eluate deposited crystals with mp about 190°C (chloroform) (0.070% of the weight of the dry plant), ν_{max} 1640 and 1620 cm^{-1} (two carbonyl groups characteristic for flavonoids), 1600 cm^{-1} (C=C), 1525 cm^{-1} (arom.).

In addition, the roots yielded β-sitosterol (0.034-0.009% of the weight of the dry plant) and oxalic acid (0.5% of the weight of the dry plant).

This is the first time that all the substances, except for scoparone, have been isolated from Artemisia scoparia.

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