



From the epigeal part of *Achillea vermicularis* Trin., collected in June in the Ordubarskii region of the Armenian SSR by aqueous extraction we have isolated a crystalline substance with the composition $C_{15}H_{18}O_4 \cdot H_2O$. The properties and spectral characteristics of this substance, and a comparison of them with those given in the literature [1, 2] have permitted the conclusion that the substance isolated is austricin (deacetylmaticarin), and this is the first time that it has been isolated from this species.

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THE LACTONES OF *Achillea biebersteinii*

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We have investigated the widely distributed plant *Achillea biebersteinii* Afan. for its lactone content [1]. The epigeal part of the plant collected in the flowering period in May in the environs of Tashkent was extracted with chloroform. The extract was treated with 50% alcohol and extracted with chloroform. The purified extract was deposited on a column of silica gel and eluted successively with benzene, chloroform, and chloroform-ethanol. The rechromatography of these eluates yielded five sesquiterpene lactones. Lactone (I) had the composition $C_{15}H_{18}O_4$, mp 164–165°C (benzene), M^+ 262, R_f 0.51 [TLC, fixed layer of silica gel, benzene-ether-methanol (5:1:1) system here and below]. According to its IR and NMR spectra, the substance has two OH groups, two methyl groups or double bonds, and an exomethylene group in a lactone ring.

Lactone (II), $C_{15}H_{18}O_4$, mp 142–143°C (benzene), M^+ 262, R_f 0.46. According to its IR and NMR spectra, the substance has two OH groups, one methyl group on a double bond, and two exomethylene groups.

Lactone (III), $C_{15}H_{20}O_4$, mp 220–221°C (benzene), M^+ 264, R_f 0.6. According to its IR spectrum, the lactone contains an OH group, a lactone C=O, a ketonic C=O, and double bonds. The NMR spectrum contains the signals of an angular methyl group, a secondary methyl group, a lactone proton, and one exomethylene group. On acetylation with acetic anhydride in pyridine, a monoacetyl derivative was obtained. Treatment of the lactone (III) with a mixture of acetic anhydride and acetic acid (2:1) gave an anhydro derivative. In their physico-chemical properties, the lactone and its derivatives are similar to the lactone artecalin and its derivatives [2]. Mixed melting points showed no depression and their IR spectra were identical.

Lactone (IV), $C_{15}H_{20}O_4$, mp 197–199°C (ethanol), M^+ 264, R_f 0.37. According to its IR spectrum, it has an OH group, a lactone C=O, and double bonds. On acetylation with acetic anhydride in pyridine, a diacetyl derivative was obtained with mp 136–138°C. According to the NMR spectrum, (IV) has one methyl on a double bond, two hydroxyls, and two exomethylene groups.

Lactone (V), $C_{15}H_{18}O_6$, mp 312–314°C (ethanol), M^+ 294, R_f 0.4. In the IR spectrum there are absorption bands at 3455 and 3495 cm^{-1} (OH), 1745 cm^{-1} (lactone C=O), and 1645–1660 cm^{-1} (C=C bond). The NMR

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spectrum shows the presence of two tertiary methyls, a lactone proton, an exomethylene group, and two hydroxyls. It forms a monoacetyl derivative with mp 216–219°C. The facts obtained show the possible identity of lactone (V) with rupin A [3].

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LACTONES OF *Artemisia ashurbajevii*

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The sesquiterpenes from the epigeal part of *Artemisia ashurbajevii* C. Winkl., collected in July at Chonkemin, Kirghiz SSR, were extracted with chloroform. The concentrated extract was treated with 60% ethanol. The precipitate that deposited was filtered off, and the filtrate was extracted with chloroform. The resin obtained after the evaporation of the chloroform was separated on a column of neutral alumina (activity grade IV) by successive elution with benzene–petroleum ether (in ratios of 1:7 and 7:3), benzene, and benzene containing 2% of acetone.

The benzene fractions yielded a colorless crystalline substance with the composition $C_{15}H_{20}O_3$ (I), mp 189°C (ethyl acetate–hexane); mol. wt. 248 (mass spectrometry), and from the fraction eluted by benzene–acetone we isolated a substance with the composition $C_{15}H_{20}O_4$ (II), mp 195–197°C (benzene–methanol); mol. wt. 264 (mass spectrometry). On TLC (alumina) in the benzene–methanol (9:1) system, substance (I) and (II) gave spots with R_f 0.57 and 0.41, respectively.

The IR spectrum of (I) (tablets with KBr) showed absorption bands at 3480 cm^{-1} (OH group), 1745 cm^{-1} (carbonyl of a γ -lactone), and 1662 cm^{-1} (C=C bond).

The IR spectrum of (II) showed absorption bands at 1765 cm^{-1} (carbonyl of a γ -lactone), 1653 and 1668 cm^{-1} (C=C bond), and $3450\text{--}3150\text{ cm}^{-1}$ (OH group). The presence of lactone rings in (I) and (II) is also confirmed by the fact that the substance dissolved on heating in dilute alkalis and when the solutions were acidified they were recovered unchanged. Substance (I) was identified as hanphyllin [1] by direct comparison. The properties of (II) corresponded to those of granilin [2], as was confirmed by comparing its IR spectrum with that of a sample of granilin isolated from *Inula grandis* and by a mixed melting point.

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