

Thus, from *F. dshizakensis* we have isolated two diastereomeric esters: chimgin [4, 5] and a new compound which we have called isochimgin which has the structure of 2 β -hydroxy-1,7,7-trimethylbicyclo[2.2.1]-heptane 4-hydroxybenzoate.

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SESQUITERPENE LACTONES FROM *Artemisia hanseniana*

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In the chromatographic separation on a column of alumina of the resin obtained by aqueous extraction [1] of the herb *Artemisia hanseniana* var. *phylostachus* collected in December, 1974, in the Shemakha region of the Azerbaizhan SSR, we have isolated five crystalline substances belonging to the group of sesquiterpene lactones. The column was eluted with hexane mixtures of hexane and diethyl ether in ratios of 4:1, 4:2, 4:3, 1:1, 1:2, 1:3, and 1:4, diethyl ether, and chloroform. The volume of each fraction was 100 ml. Fraction 4, obtained on elution with hexane, yielded a substance (I); fraction 3, obtained on elution with diethyl ether gave substance (II); fraction 5, eluted with ether, gave substance (III); fraction 7, also eluted with ether, gave substance (IV); and a second chromatographic separation of the mother liquor from fraction 5 gave compound (V).

Substance (I), $C_{15}H_{20}O_3$, mp 116–118°C (from hexane) was isolated in small amount. Its IR spectrum has the band of a γ -lactone ring (1785 cm^{-1}) and of a ketone group in a 6-membered ring (1717 cm^{-1}). By comparing melting points and IR spectra, (I) was identified as taurin [2–4].

Substance (II), $C_{15}H_{22}O_4$, had mp 231–232.5°C (from ethanol). Its IR spectrum contained the bands of OH groups (3540 and 3460 cm^{-1}), of a γ -lactone ring (1770 cm^{-1}), and of a double bond (1650 cm^{-1}). It formed a monoacetate $C_{17}H_{24}O_5$ with mp 219–221°C. Oxidation led to a keto derivative $C_{15}H_{20}O_4$, mp 263–264°C.

A comparison of the compositions melting points, and IR and NMR spectra of (II) and its derivatives with the corresponding characteristics of artemin and its derivatives [2–4] showed their respective identities.

Substance (III), $C_{15}H_{22}O_4$, had mp 225–226°C, and it has been proposed to call it phylostachin [5]. Its IR spectrum has the bands of OH groups (3460–3300 cm^{-1}), of the CO group of a γ -lactone (1775 cm^{-1}) and of a double bond (1650 cm^{-1}). The IR spectrum of (III) differed from that of artemin but was nevertheless similar to it. The NMR spectrum of (III) showed the singlet of an angular methyl group at 0.88 ppm, the doublet of a secondary methyl group with its center at 1.23 ppm ($J = 6$ Hz), and one-proton singlets of an exomethylene group at 4.96 and 5.02 ppm. The signals of a lactone proton and of the protons of a hemihydroxy group were superposed in the 4.0–4.4 ppm region. The NMR spectra of (II) and (III) were identical. Such a spectral behavior is characteristic for α - and β -santonins [6]. Consequently, (III) differed from (II) only by the orientation of the CH_3 group at C_{11} . A sesquiterpene lactone differing from artemin only by the configuration of the C_{11} asymmetric center has been described in the literature under the name of arsubin [7–9]. Consequently, phylostachin and arsubin are one and the same compound.

Substance (IV), $C_{15}H_{20}O_4$, had mp 176–177°C (from ethanol). Its IR spectrum had the maxima of an OH group (3500 cm^{-1}), of the CO group of a γ -lactone ring (1700 cm^{-1}), of the CO of a conjugated ketone group

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(1670 cm^{-1}), and of a double bond (1640 cm^{-1}). The OH group was tertiary, since it was not oxidized by chromium trioxide and did not undergo acetylation. A comparison of the composition, melting point, and IR and NMR spectra with those for tauremisin [3, 10] showed their identity. A mixture of an authentic sample of tauremisin and (IV) gave no depression of the melting point.

Substance (V), $\text{C}_{15}\text{H}_{22}\text{O}_4$, had mp 193–194°C. Its IR spectrum showed the bands of OH groups (3470 and 3450 cm^{-1}), of the CO group of a lactone ring (1753 cm^{-1}), and of a double bond (1647 cm^{-1}). It contained a methylene double bond (singlets at 4.96 and 5.14 ppm of 1 H each), an angular methyl group (singlet 0.76 ppm), and a secondary methyl group (doublet at 1.20 ppm, $J = 6$ Hz). On acetylation, a diacetate $\text{C}_{19}\text{H}_{26}\text{O}_2$ with mp 179–181°C was formed (giving singlets at 2.0 and 2.08 ppm). The IR spectrum of (V) differed from that of erevanin [11]. However, their NMR spectra differed, mainly by the nature of the splitting of one of the geminal protons of the hydroxy groups. Compound (V) is probably a new stereoisomer of erevanin.

The IR spectra were taken on a UR-20 spectrophotometer in paraffin oil and the NMR spectra on a Varian HA-100D spectrometer in CDCl_3 . The chemical shifts are given in the δ scale. TMS was used as internal standard.

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GUAIAOL AND HYDROXYAROMATIC ACIDS OF

Ferula ferulaeoides

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From the lipophilic fraction of the roots of *Ferula ferulaeoides* (Steud.) Korov collected in the phase of unripe fruit (Kazakhstan, village of Uch-Aral, Taldy-kurgan oblast on August 18, 1972) we have isolated a compound with the composition $\text{C}_{15}\text{H}_{26}\text{O}$ (M^+ 222), mp 91°C, $[\alpha]_D^{25} - 26.3^\circ$ (c 1.9; MeOH).

The substance was identified (on the basis of its constants, composition, and IR spectrum) as a tertiary sesquiterpene alcohol previously isolated from this botanical species and called shairol. According to Kir'yalov [1], shairol is a bicyclic compound (of the guaiane type) with a tertiary hydroxy group and a difficultly hydrogenatable double bond [1]. We have continued the study of this substance.

Its PMR spectrum (Varian HA-100 D, CCl_4 , 0 – HMDS) showed the signals of two tertiary and two quaternary methyl groups at 0.92 (d, 3H, $J = 7$ Hz), 0.95 (d, 3H, $J = 7$ Hz), 1.06 (c, 3H), and 1.1 ppm (s, 3H).

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