The composition of the fractions of monoterpene hydrocarbons were studied by the GLC method on a Pye-104 chromatograph. β,β'-Oxydipropionitrile (12%) at 70°C and PEGA (10%) at 100°C were used as stationary phases. To identify the monoterpene hydrocarbons we used the values of the relative retention volumes given in the literature and, in addition, the presence of the majority of them was confirmed with the aid of markers.

By means of GLC analysis we identified the following hydrocarbons in the monoterpene fractions of the essential oils of the Cyprus and the green lavender cottons: α-* and β-pinenes, α-fenchene, sabinene, myrcene,* α- and β-phellandrenes, limonene,* γ-terpinene,* and p-cymene.*

When the fraction of monoterpene oxygen compounds from the essential oil of the Cyprus lavender cotton was rechromatographed on a column of Al_2O_3 (activity grade II), we isolated a substance $C_{10}H_{16}O_3$ with mol. wt. 152 (mass spectrum). Its properties (n_D^{20} 1.4708, d_4^{25} 0.8750, bp 64.5°C/9 mm Hg; semicarbazone with mp 96.4-96.8°C) and its spectral characteristics (IR, UV, and NMR spectra) permitted this substance to be identified as artemisia ketone. In addition, we obtained a 2,4-dinitrophenylhydrazone with mp 78.5-79°C.

From the fraction of monoterpene oxygen compounds from the Cyprus lavender cotton (after the isolation of the artemesia ketone) and also from all the fractions of monoterpene oxygen compounds from the essential oil of the green lavender cotton by our own modification of the method of L. Francesconi and N. Granata [1, 2] we isolated a hydroxylamine oxime with mp 190-190.5°C, the hydrolysis of which gave a very volatile liquid substance. Its physicochemical constants (n_D^{20} 1.4687, d_4^{20} 0.8886, semicarbazone with 220°C coincided with literature information for the monoterpene ketone α-santolinenone [1-3].

---

*These substances were identified with the aid of markers.

LITERATURE CITED

1. L. Francesconi and N. Granata, Gazz. Chim. Ital., 150 (1914).
2. L. Francesconi, N. Granata, and A. Sanna, Gazz. Chim. Ital., 354 (1914).
3. L. Francesconi and N. Granata, Gazz. Chim. Ital., 167 (1915).

ESTERS OF THE ROOTS OF Ferula dshizakensis

V. N. Borisov, A. I. Ban'kovskii,
V. I. Sheichenko, V. S. Kabanov, and M. G. Pimenov

UDC $547.26^1.11{:}638.88$

Continuing a study of esters of plants of the genus Ferula, from a methanolic extract of the roots of Ferula dshizakensis Korov, collected in May, 1973, in the budding phase (Uzbek SSR, R. Sanzar) we have isolated a mixture of two diastereomeric compounds with the composition $C_{17}H_{22}O_3$ (M^+ 274). Alkaline hydrolysis and reduction with $LiAlH_4$ gave p-hydroxybenzoic acid, $C_7H_6O_3$, mp 207-209°C (comparison of physicochemical properties and mixed melting point) and two epimeric hydroxyterpenes with the composition $C_{10}H_{18}O$ (M^+ 154), mp 207°C. In the PMR spectrum (CCl_4, 0 – HMDS, 20°C) of the hydroxyterpenes an axially-oriented proton geminal to an exo-OH group appears in the form of a triplet at 3.47 ppm (1H; $W_{1/2}$ = 10 Hz) and an equatorial methine proton at an endo-OH group in the form of a multiplet at 3.86 ppm (1H; $W_{1/2}$ = 11 Hz) [1, 2].

The ratio of the integral intensities of the geminal and hydroxy-group protons and a calculation of the ratio of the relative intensities of the dehydration and molecular peaks for the terpenols corresponded to a quantitative ratio of the diastereomers in the natural mixture of 1 : 1 [3].

Oxidation of the terpenoid alcohols with chromium trioxide in 60% acetic acid gave a common ketone $C_{10}H_{16}O$, mp 177°C, identified as camphor.

All-Union Scientific-Research Institute of Medicinal Plants, Moscow. Translated from Khimiya Prirodnykh Soedinenii, No. 5, p. 665, September-October, 1976. Original article submitted March 1, 1976.

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 2β-hydroxy-1,7,7-trimethylbicyclo[2.2.1]-heptane 4-hydroxybenzoate.

LITERATURE CITED

1. M. Karplus, J. Chem. Phys., 30, 11 (1959).
2. T. J. Flautt and W. F. Ermann, J. Am. Chem. Soc., 85, (20), 3212 (1963).
3. K. Biemann and J. Seibl., J. Am. Chem. Soc., 81, 3149 (1959).
4. Kh. M. Kamilov and G. K. Nikonov, Khim. Prirodn. Soedin., 718 (1972).
5. V. N. Borisov, A. I. Ban'kovskii, V. I. Sheichenko, and M. G. Pimenov, Khim. Prirodn. Soedin., 674 (1973).

SESQUITERPENE LACTONES FROM Artemisia hanseniana

S. V. Serkerov, R. M. Abbasov,
and A. N. Aleskerova

UDC 547.314

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 chracteristics 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

---

V. L. Komarov Institute of Botany, Academy of Sciences of the Azerbaidzhan SSR, Baku. Mardarkyan Arboretum, Academy of Sciences of the Uzbek SSR, Baku. Translated from Khimiya Prirodnykh Soedinenii, No. 5, pp. 665-666, September-October, 1976. Original article submitted March 1, 1976.