quartet $-CH_3$; 28.4, doublet, >CH—; 34.86, doublet, >CH—; 62.3, triplet, $-CH_2O-$; 123.98, doublet, —CH=; 131.9, singlet, >C= [1].

The PMR spectrum of the alcohol (Fig. 1b) had the same signals as its acetate except that in place of the signal of the CH_3CO group in the 3.97 region the signal of the proton of a hydroxy group appeared.

According to their compositions and spectral characteristics, the substances isolated had the most probable structures of 1-hydroxymethylene-3-(isobuten-1-yl)-2,2-dimethylcyclopropane and its acetyl derivative.

The literature treatments of the results obtained showed that an alcohol with such a structure has been obtained by the reduction of the methyl ester of chrysanthemic acid with the aid of lithium tetrahydroaluminate and has been called chrysanthemol [2]. It was found that 25 mg of natural chrysanthemol has been isolated from the essential oil of the leaves of the wormwood *Artemesia ludoviciana* [3]. Since the constants of our alcohol differed from those given for chrysanthemol in [2] and [3] and, consequently, could not be used for identification, we oxidized the alcohol with chromium trioxide in pyridine in methylene chloride solution to the aldehyde [4] and the latter with silver oxide to the acid. After having been methylated with diazomethane, it gave a compound the PMR spectrum of which coincided with that of methyl trans-chrysanthemate [5].

Thus, we have isolated and described natural chrysanthemyl acetate for the first time.

LITERATURE CITED

1. F. Bohlman and R. Zeisberg, Org. Magn. Reson., 7, 426 (1975).
2. O. Inoue, Sci. Insect Control., 3, 149-154 (1955).
3. A. Kenneth and E. Williams, J. Org. Chem., 40, No. 17, 2576 (1975).
4. R. Ratcliffe and P. Rolchorst, J. Org. Chem., 35, No. 11, 4000 (1970).
5. A. F. Bramwell, L. Crombie, P. Hemesley, and G. Pattenden, Tetrahedron, 25, 1727 (1969).

CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *Ambrosia artemisifolia*

V. V. Chubinidze, L. V. Beradze, and L. D. Bochoridze

UDC 547.913

The plant *Ambrosia artemisifolia* L. (common ragweed) — a weed of the family Asteraceae is widely distributed on the territory of our country and beyond its borders [1-3].

In the present paper we give the results of an investigation of the chemical composition of the essential oil of common ragweed growing in Georgia.

The essential oil was obtained by steam distillation from the epigeal part of plants collected in the environs of Tbilisi. The water—oil distillate was extracted exhaustively with pentane. The solvent was distilled off and the oil was dried over anhydrous sodium sulfate.

The essential oil of ragweed formed a mobile liquid with a light yellow color and the following physical and chemical indices: n_D^{20} 1.491-1.4998; d_{20}^{20} 0.872-0.885; $[\alpha]_D^{20}$ 37.5°; acid No. 1.5; ester No. 12-25; ester No. after acetylation 89.

The essential oil obtained was treated with 5% aqueous sodium carbonate solution and the free acids were isolated. After the separation of the acids, the oil was separated by fractional distillation into monoterpene and high-boiling fractions [4]. The high-boiling fraction was saponified and was separated by column chromatography (on alumina of activity grade II-III) into sesquiterpene and oxygen-containing compounds. These were eluted with petroleum ether and diethyl ether. The analytical and preparative GLC of the monoterpene,

Institute of Plant Biochemistry, Academy of Sciences, of the Georgian SSR, Tbilisi.

Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 529-530, August-September, 1984. Original article submitted January 12, 1984.

0009-3130/84/2004-0504$08.50

sesquiterpene, and oxygen-containing compounds was carried out on Vyrukhrom and PAKhV-08 instruments.

The monoterpene hydrocarbons were identified from their relative retention times and by the addition of pure substances.

The sequiterpene hydrocarbons were isolated with the aid of PGLC and were identified from their spectral characteristics and physicochemical indices. The ragweed essential oil contained more than 60 individual compounds, among which we identified 18 components: α-pinene, sabinene, β-pinene, limonene, 1,8-cineole, γ-terpinene, p-cymene, terpinen-4-ol, cis- and trans-artemesia ketones, methylchavicol, borneol, camphor, bornyl acetate, artemsia alcohol, geraniol, β-caryophyllene, and α-humulene. The main components of the oil were the cis- and trans-artemisia ketones, which made up 33% of the total amount of the oil. It is apparently just these substances that are responsible for the characteristic odor of ragweed oil.

LITERATURE CITED

1. B. N. Rutovskii and I. V. Vinogradova, Tr. Nauchn. Khim.-Farm. Inst., No. 22, 110 (1930).
2. D. S. Vasil'ev, Vestn. S.-Kh. Nauk, No. 5, 135 (1958).
3. D. S. Vasil'ev, Bot. Zh., 44, No. 6, 843 (1959).
4. M. I. Goryaev and I. Pliva, Methods of Investigating Essential Oils [in Russian], Alma-Ata (1962).

TRITERPENES OF *Zizifora bungeana*

A. A. Bimurzaev and G. K. Nikonov

UDC 547.918:547.926

On investigating ethanolic extracts of the herb *Zizifora bungeana* Juz. (Bunge's zizifora) [1], we detected the presence in it of three substances with R_f 0.35, 0.45, and 0.70 in the chloroform–methanol (5:1) system which were colored cherry-red by antimony trichloride (TLC on Silufol plates).

By adsorption chromatography on silica gel we isolated substances A and B. Substance A had the composition $C_{30}H_{48}O_3$, mp 271-273°C (from ethanol), $[\alpha]_D^{20}$ +100 ± 5° (c 0.65; (dimethyl sulfoxide), R_f 0.7 (chloroform–methanol (5:1)). When the UV spectrum was recorded in concentrated sulfuric acid, an absorption maximum appeared at 312 nm, which showed that the substance was a triterpene acid [3]. This was also shown by the mass spectrum which contained M^+ 456 and peaks with m/z 207 and 248 corresponding to the β-decomposition of ursane derivatives, and also ions with m/z 203 and 133 formed by decarboxylation and the splitting out of ring E [4]. ν_{max}^{KBr} (cm^{-1}): 3440-3460 (OH group), 1690 (C=O of an acid), 1270, 670 (cis-trisubstituted C=C bond).

The PMR spectrum of substance A (in Py-d_5, 80 MHz, BS-487-C Tesla NMR spectrometer, HMDS, δ, ppm): 5.32 (h/2 = 8 Hz, olefinic proton); 3.30 (J = 9 Hz, 1 H, proton at C_3); singlets at 1.18 (3 H), 1.10 (6 H), 0.90 and 0.88 (3 H each) — tertiary methyl groups; doublet at 0.80 ppm, J = 8 Hz (6 H) — secondary methyl groups; 2.48, doublet, J = 1 Hz (2 H) — proton at C_{18}. The facts given permit substance A to be assigned to the triterpene hydroxy acids of the ursane series. Its IR and PMR spectra were extremely close to those of ursolic acid but did not coincide with them: differences were observed in the melting points of the acids and of their acetates and methyl esters [2, 5-9]. It is most likely that substance A was one of the isomers of ursolic acid. Brieskorn [7] has shown that ursolic acid isolated from plants is a natural mixture of two isomers — ursolic acid proper (I) (C_{18}-Hα and C-COOHβ) with mp 285°C and an ursolic acid (II) (C_{18}-Hβ and C–COOHβ) with mp 276°C. The native compound is the acid (II), which is converted into the ursolic acid (I) during isolation under the action of alkalis. The discrepancies of the melting points

Alma-Ata State Medical Institute. Institute of Chemical Sciences, Academy of Sciences of the Kazakh SSR, Alma-Ata.

Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 530-531, August-September, 1984. Original article submitted October 19, 1983.

0009-3130/84/2004- 0505$08.50