# FATTY ACID COMPOSITIONS OF THE LIPIDS OF SOME MEDICINAL PLANTS

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UDC 547.915:543.544

We have investigated the physicochemical properties and fatty acid compositions of the lipids of medicinal plants [1-6] growing in the Tyumen' province: the herbage of *Artemisia absinthium* L. (common wormwood), the leaves of *Tussilago farfara* L. (common coltsfoot), family Compositae collected in the flowering period, and the seeds of *Viburnum opulus* L. (European cranberry viburnum), family Caprofoliaceae, collected in the fruit-bearing period.

The main physicochemical properties of the lipids isolated by extraction with ether are given in Table 1.

TABLE 1. Physicochemical Properties of the Lipids

| Index | Lipids | | |
|---|---|---|---|
| | wormwood herbage | coltsfoot leaves | viburnum seeds |
| Yield, % | 3.2 | 2.7 | 15.0 |
| $n_D^{20}$ | 1.4523* | 1.4501 | 1.4702 |
| $d_4^{20}$ | 0.920* | 0.920 | 0.910 |
| Acid No., mg KOH | 2.8 | 2.2 | 0.6 |
| Saponification No., mg KOH | 228.0 | 226.0 | 198.5 |
| Iodine No., % $I_2$ | 42.0 | 66.0 | 120.9 |
| Unsaponifiables, % | 1.1 | 1.5 | 5.2 |
| Chlorophyll *a*, μg/g | 132.0 | 181.3 | — |
| Chlorophyll b, μg/g | 53.0 | 159.9 | — |
| β-Carotene, mg-% | 16.0 | 43.3 | 8.0 |

*The constants were determined at 40°C.

TABLE 2. Fatty Acid Compositions of the Lipids, %

| Acid, $C_n$ | Lipids | | | Acid, $C_n$ | Lipids | | |
|---|---|---|---|---|---|---|---|
| | wormwood herbage | coltsfoot leaves | viburnum seeds | | wormwood herbage | coltsfoot leaves | viburnum seeds |
| $C_{6:0}$ | 1.1 | — | — | $C_{14:1}$ | 1.5 | 1.6 | - |
| $C_{8:0}$ | 0.9 | 1.6 | — | $C_{15:0}$ | 0.9 | 1.5 | — |
| $C_{9:0}$ | — | 0.4 | — | $C_{15:1}$ | 0.8 | 1.6 | — |
| $x_1$ | — | 1.7 | — | $x_4$ | — | 6.5 | — |
| $C_{10:0}$ | 2.9 | 1.1 | — | $C_{16:0}$ | 7.3 | 26.2 | 5.6 |
| $C_{11:0}$ | 19.6 | 0.9 | — | $C_{16:1}$ | 3.4 | 5.8 | 0.8 |
| $x_2$ | 4.5 | — | — | $C_{17:0}$ | 0.4 | 6.9 | 0.5 |
| $C_{12:0}$ | 4.5 | 7.9 | — | $C_{17:1}$ | 0.4 | 1.4 | 0.1 |
| $x_3$ | 2.4 | — | — | $C_{18:0}$ | 1.9 | 0.9 | 0.7 |
| $C_{12:1}$ | - | 1.6 | — | $C_{18:1}$ | 12.6 | 9.2 | 40.3 |
| $C_{13:0}$ | 5.8 | 1.5 | — | $C_{18:2}$ | 9.9 | 10.2 | 48.9 |
| $C_{13:1}$ | - | 1.3 | | $C_{18:3}$ | 0.5 | 5.3 | 1.5 |
| $C_{14:0}$ | 18.6 | 3.5 | 0.5 | $C_{20:0}$ | — | 1.2 | 1.0 |

Tyumen' State Medical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 6, pp. 793-795, November-December, 1981. Original article submitted August 20, 1981.

 0009-3130/81/1706- 0584$07.50 

The fatty acid composition of the plant lipids was determined by the GLC method on a Vyrukhrom instrument with a flame-ionization detector (Table 2). GLC conditions: column 300 × 0.4 cm; support — Celite 545 (50-60 mesh); stationary phase — polyethyleneglycol adipate (15%); column temperature 198°C; pressure of helium 0.6-0.8 kg/cm$^2$.

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# STRUCTURE OF THE NEW COUMARIN OBTUSIPRENOL


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UDC 547.15/17:582:29


Continuing an investigation of the coumarins of *Haplophyllum obtusifolium* [1], an aqueous ethanolic extract of the epigeal part has been chromatographed on a column of silica gel. The substances were eluted with chloroform—methanol. At a 19:1 composition of the mixture, a new coumarin I was eluted with the composition $C_{15}H_{16}O_6$ ($M^+$ 292), mp 106-108°C (chloroform—ethanol (8:2)] $\lambda_{max}^{C_2H_5OH}$ 229, 263, 340 nm (log ε 4.28, 4.01, 4.14), which has been named obtusiprenol. The IR spectrum of (I) has maxima at ($cm^{-1}$) 3530, 3290-3410 (OH groups), 1702 (α-pyrone C=O), and 1617 and 1588 (aromatic C=C vibrations). The UV spectrum of (I) is similar to the spectra of fraxetin and of obtusiprenin [1]. A positive reaction with a solution of $FeCl_3$, and also a bathochromic shift of the long-wave band in the presence of $AlCl_3$ ($\lambda_{max}$ 215, 276, 364 nm) shows the presence of a ortho-dihydroxy grouping in the benzene ring [2].

The PMR spectrum of obtusiprenol (Py-$d_5$, δ scale) shows, in addition to the signals of the H-3 (doublets at 6.09 ppm, J 10 Hz) O and of a $CH_3$ and H-4 group (3.83 ppm, 3 H, s) the signals of the protons of a — $CH_2$—CH=C—$CH_2OH$ side chain at 1.85 ppm (doublets at 7.75 ppm,

$CH_3$

J 10 Hz), 3.60 (2 H, d, 6.5 Hz), 4.12 (2 H, br.s), and 5.60 ppm (1 H, t, 6.5 Hz). The acetylation of (I) in pyridine with acetic anhydride gave a triacetyl derivative (II) with mp 139-140°C having the composition $C_{21}H_{22}O_9$. The PMR spectra of (II) ($CDCl_3$) differs from that of (I) by the presence of the signals of the protons of two Ar—$OCOCH_3$ groups (2.29 and 2.31 ppm, s, 3 H) and of a —$CH_2OCOCH_3$ group (1.97 ppm, s, 3 H), and also by the displacement of the signal of the gem-acyl methylene group downfield by 0.24 ppm. The H-4 chemical shift shows the absence of an oxygen-containing substituent at C-5 [3, 4], and consequently, this position is occupied by a hydroxyprenyl group. The facts presented, and also a comparison of the UV, PMR, and mass spectra of (I) with those of obtusiprenin (III) [1] permits structure (I) to be put forward for obtusiprenol. (See scheme on following page.)

The mass spectrum of (I) contains the following strong ion peaks, m/z (%): $M^+$ 292 (54), 261 ($M - CH_3O$, 16), 243 ($M - CH_3O - H_2O$, 39), 229 (25), 221 (21), 225 (66), 208 (23), 207 (20), 125 (27), 123 (32), 121 (34), 120 (43), 111 (34), 109 (32), 106 (41), 97 (52), 95 (50), 93 (57), 91 (20), 85 (43), 83 (55), 81 (50), 71 (68), 69 (73), 67 (36), 57 (100), 55 (82). The peaks of the ions with m/z 85 and 71 confirm the structure of the side chain of obtusiprenol.


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Translated from Khimiya Prirodnykh Soedinenii, No. 6, pp. 795-796, November-December, 1981. Original article submitted July 1, 1981.

0009-3130/81/1706-0585$07.50