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NEUTRAL LIPIDS OF BARK OF THE ROOTS OF Maclura aurantica

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The air-dry comminuted bark of the roots (4 kg) of osage orange was extracted with petroleum ether (40-70°C). When the extract was evaporated, yellow crystals deposited with mp 182-183°C, composition $C_{23}H_{22}O_6$, which, on the basis of their IR, UV, and PMR spectra, were identified as 12-(1,1-dimethylallyl)-5,9,10-trihydroxy-2,2-dimethyl-2H,6H-pyrano[3,2-b]xanthen-1-one (macluraxanthone); yield 0.04% [1].

On further evaporation of the extracts, lipids were obtained in the form of a viscous yellow liquid (25 g). When the lipids (5 g) were saponified with a 0.5 N solution of KOH in methanol, two fractions were obtained: unsaponifiable (1) and saponifiable (2).

Fraction 1 was deposited on a column of KSK silica gel (0.16-0.20 mm). When the column was washed with petroleum ether, a fraction was obtained with mp 55-57°C in a yield of 0.008% (on the dried weight of the bark) which consisted of the sum of the hydrocarbons, and its qualitative and quantitative compositions were studied by gas–liquid chromatography on a Chrom-5 instrument. GLC conditions: glass column 0.4 × 250 cm, filled with 10% of diethyleneglycol succinate on Chromaton NAW (0.20-0.25 mm) at a column temperature of 204°C and an evaporator temperature of 250°C. Hydrocarbons were identified from their retention times with markers [2, 3]. Composition of the hydrocarbons (5): $C_{10:0}$ – 0.1; $C_{12:0}$ – 0.3; $C_{14:0}$ – 0.2; $C_{15:0}$ – 0.6; $C_{16:0}$ – 0.3; $C_{18:0}$ – 0.2; $C_{20:0}$ – 0.8; $C_{21:0}$ – 0.7; $C_{22:0}$ – 0.8; $C_{23:0}$ – 0.5; $C_{24:0}$ – 0.4; $C_{25:0}$ – 1.7; $C_{26:0}$ – 1.1; $C_{27:0}$ – 35.5; $C_{28:0}$ – 7.1; $C_{29:0}$ – 49.7. The main hydrocarbons of the bark of the root of osage orange are heptacosane, octacosane, and nonacosane, which together amount to 92.3%. When the column was washed with petroleum ether–ethyl acetate (3:1) a substance was isolated with mp 190-191°C (melting point of the acetate 205-206°C), which was identified by IR, UV, and PMR spectroscopy as lupeol; yield 0.0007% (on the dry weight of the bark).

When the concentration of ethyl acetate in the eluting mixture was increased further, prenylated xanthones were isolated: tovoxanthone (0.006%), 6-deoxyjacareubin (0.001%), macluraxanthone (0.06%), and alvaxanthone (0.02%) [4]. IR, UV, and PMR spectroscopies were used to establish the structures of the xanthones.

Fraction 2 was methylated [5] and analyzed by GL on a column (see above) at a temperature of 180°C. Composition of the fatty acids (%): $C_{9:0}$ – 0.6; $C_{14:9}$ – 1.8; $C_{15:0}$ – 0.6; $C_{15:1}$ – 0.1; $C_{16:0}$ – 36.7; $C_{16:1}$ – 0.6; $C_{18:0}$ – 1.6; $C_{18:1}$ – 28.3; $C_{18:2}$ – 5.8; $C_{18:3}$ – 23.9. The main acids from the root bark were palmitic, oleic, and linolenic. The qualitative composition of the root fatty acids is analogous to the fatty acid composition of the fatty oil from the fruit [6]. Thus, the neutral lipids of the bark of osage orange roots form a complex combination of substances which includes hydrocarbons, fatty acids, the triterpene alcohol lupeol, and prenylated xanthones. We are first to have shown the presence of these components in the lipids.

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LIPIDS OF THE EELGRASSES Zostera nana AND Zostera marina

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The lipids of eelgrasses have been little studied. There are only a few publications devoted to the investigation of the fatty acids and lipids of eelgrasses from various regions of the world oceans [1-4].

We have investigated the phospholipid and fatty acid composition of two species of eelgrasses of the Black Sea, Zostera nana and Zostera marina. The plants were collected in the region of the Karadag biostation in July, 1987, from a depth of 3-10 m.

The extraction of the lipids and the isolation and quantitative determination of the phospholipids and fatty acids were carried out by a known method [4, 5]. The fatty acids were identified with the use of chromato-mass spectrometry as described previously [6].

TABLE 1. Compositions of the Fatty Acids (GLC, wt. %) and Phospholipids of Total Lipid Extracts from the Eelgrasses Zostera nana and Zostera marina

Fatty acid	Zostera nana	Zostera marina	Phospholipids, % of the total lipid phosphorus	Zostera nana	Zostera marina
14:0	1,1	0,9	Phosphatidylglycerol	15,5	13,9
16:0	19,6	17,2	Phosphatidylethanolamine	24,3	23,9
16:1	11,4	1,3	Phosphatidylcholine	45,1	43,1
16:2ω6	2,2	0,5	Phosphatidylinositol	10,3	12,2
16:4ω3	9,8	1,1	Phosphatidylserine	4,8	6,9
18:0	4,2	1,8	Phospholipids, % of the total lipids	27,8	24,3
18:1ω9	13,7	10,3	Amount of total lipids, mg/g crude weight	5,3	7,1
18:2ω6	5,1	12,8			
18:3ω3	12,1	35,9			
18:4ω3	10,7	2,5			
20:4ω6	2,0	0,6			
20:5ω3	4,6	13,7			
22:5ω3	2,5	0,5			
22:6ω3	1,0	0,9			

Thus, the eelgrass species investigated differed with respect to their fatty acid compositions: For Zostera nana the main fatty acids were identified as the 16:0, 16:1, 18:1, 18:3, and 18:4 varieties, and for Zostera marina 16:0, 18:1, 18:2, 18:3, and 20:5. The main phospholipids were phosphatidylcholine and phosphatidylethanolamine, their amounts in the two species being approximately the same.

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