BRIEF COMMUNICATIONS

ALKANES IN THE POLLEN AND SPORES OF VARIOUS PLANTS

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An important problem in organic geochemistry is the sources of organic matter (OM) in marine deposits. The greatest informativeness in its solution is possessed by the n-alkanes which, passing into the lipid fraction of the OM, enrich it with hydrocarbons of different compositions.

To determine the significance of the n-alkanes in the composition of the OM of the deposits of neighboring bodies of water we have studied the individual compositions of paraffinic hydrocarbons of a fern of the family Polypodiaceae gathered on Kamchatka, the pollen of the pine Pinus sylvestris gathered in the Caucasus, and a herbaceous plant of the family Chenopodiaceae.

The outer membranes of the spores and pollen were broken down by careful grinding in an agate mortar. To extract the lipids, the ground material was treated with chloroform at room temperature. The extract was distilled almost to dryness in a vacuum evaporator and it was then transferred to a tared weighing bottle and was dried in a vacuum thermostat at 40°C to constant weight. The methanic-naphthenic fraction of the carbons (HCs) was isolated from the lipids by hexane by using column chromatography on silica gel L (60-100 mesh, Czechoslovakia). The individual compositions of the alkanes were determined with the aid of gas-liquid chromatography on a JLD Instrument chromatograph (France). A flame-ionization detector was used (capillary column 25 m long containing the liquid phase OV-17 under the regime of temperature programming from 100 to 280°C at the rate of 8°C/min, with hydrogen as the carrier gas). The chromatograms were calculated with the aid of a JLD Instrument integral device.

The fern spores were characterized by the highest level of lipids (13.0%), but the amount of methanic-naphthenic HCs in them was comparatively low (2.2%). A high level of this group of HCs was found in the pollen of the pine (17.2%) and of the representative of Chenopodiaceae (14.0%) at a lower concentration of lipids (10.5 and 6.6%, respectively). The individual compositions of the paraffinic hydrocarbons in the materials studied differed substantially:

Material	$\sum C_{14}-C_{24}$	$\sum C_{25}-C_{30}$	$\frac{\sum nC\ odd}{\sum nC\ even}$	Concentration maxima
Spores of a fern of the family Polypodiaceae	48.75	51.25	1.5	C_{21}, C_{23}, C_{25}, C_{27}, C_{29}
Pollen of the pine Pinus sylvestris	55.80	44.20	0.9	C_{22}, C_{23}, C_{26}, C_{28}
Pollen of plant of the family Chenopodiaceae	94.60	5.40	0.7	C_{18}, C_{19}, C_{20}, C_{21}, C_{22} C_{24}

The hydrocarbon fraction isolated from the fern spores consisted of a mixture of n-alkanes with from 14 to 30 carbon atoms in the molecule with a predominance of compounds with an odd number of atoms $\left(\frac{\sum nC\ odd}{\sum nC\ even} = 1.5\right)$; there were concentration maxima at C_{21}, C_{23}, C_{25}, C_{27}, and C_{29}. The spectrum of the n-alkanes from the pine pollen fell into the range of C_{16}-C_{31} with concentration maxima at C_{22}, C_{23}, C_{26}, and C_{28} and with an oddness factor close to 1. The n-alkanes isolated from the pollen of a plant of the family Chenopodiaceae consisted mainly of comparatively short-chain structures ($\Sigma_{nC(14-24)}$ = 94.6%) with a low oddness factor (0.7). Thus, the nature of the distribution of the n-alkanes isolated

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from the fern spores was close to that in the waxes of higher plants, and that from the pine pollen and the Chenopodiaceae pollen was close to that of the lipids of marine organisms.

LITERATURE CITED

1. S. M. Manskaya, P. A. Kodina, and V. N. Generalova, The Chemical Investigation of the Outer Membrane of Pollen and Spores. Palynology in Medicine [in Russian], Nauka, Moscow, Vol. 5 (1973), p. 71.
2. J. Brooks, "Some chemical and geochemical studies on sporopollenin," in: Sporopollenin, Academic Press, New York (1971), p. 341.
3. A. V. Zhukov and A. G. Vereshchagin, "An instrument for the quantitative extraction of lipids from plant material," Fiziol. Rast., 21, No. 3, 659 (1971).
4. Yu. I. Korchagina and O. P. Chetverikova, Methods of Investigating the Disseminated Organic Matter of Sedimentary Rocks [in Russian], Nauka (1976), p. 227.
5. Methods of Investigating Organic Matter in the Ocean [in Russian], Nauka, Moscow (1980), p. 333.

POLYSACCHARIDES OF Achillea asiatica

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The yarrow Achillea asiatica Serg., family Asteraceae, is a valuable medicinal and essential-oil plant. Its herbage and inflorescences are the source of a wound-healing preparation [1].

We have investigated the polysaccharide complexes (PSCs) from the herbage of the yarrow collected in the flowering phase in Tomsk province, and also that from the meal after the extraction of the essential oil from the herbage [2]. In addition, we used herbage and meal that had been extracted twice with chloroform at room temperature. The polysaccharides extracted from the raw material with hot water (95°C, 2 h) were investigated, the PSCs being precipitated with ethanol.

The amounts of PSCs (% on the weight of the air-dry raw material) and their qualitative compositions are given below:

Object of investigation	Yield of PSCs	Amounts in the PSCs, % neutral sugars	including free sugars
Herbage	2.60	24.90	0.21
Meal	7.85	36.80	0.27
Chloroform-purified:			
herbage	3.70	21.25	0.27
meal	9.05	36.40	0.24

The greatest yield of PSCs was obtained from the meal. Purification with chloroform also increased the yield of PSCs. The greatest amount of neutral sugars was present in the PSCs from the meal (36.80%). Previous treatment of the raw material and the meal with chloroform did not appreciably change the amounts of neutral sugars in the PSCs.

We then studied the PSCs from the purified raw material. The PSCs consisted of pulverulent substances soluble in water and insoluble in organic solvents. The PSCs contained

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