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PRECAMBRIAN NAPHTIDES AND HEAVY OILS OF ANCIENT RUSSIAN PLATFORMS

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Bitumen and heavy oils (naphtides) spatially and genetically connected to Precambrian sequences have been the object of investigations. Among these bitumens two genetic groups are marked out: 1 - bitumen formed from Precambrian oils generated by Precambrian rocks, yet obtained bitumen form in Phanerozoic; 2 - Precambrian bitumen being Precambrian by formation time. It is not always possible to identify these two groups different in formation time.

Deposits of heavy oils are present in Upper Proterozoic sediments of Upper-Kamsk depression, East-European platform. Oils are heavy, waxy, with low sulfur content, predominantly naphthenetic; isotopically light ($\delta^{13}C$- 31 -34‰), - considered to be biodegraded. By sterane distribution Precambrian naphtides differ a lot. Oils of Upper-Kamsk depression are characterized by sharp prevailing of ethylcholestane typical for most of "ancient" oils of Eastern Europe and Oman, at that time steranes C_{27} and C_{28} are practically absent. 28,30-bisnorhopane C_{28} was first identified in Sivinsk oil and was divided into three epimers 17α(H),21β(H); 17β(H),21α(H); 17β(H),21β(H). Most stable among dimethilized hopanes is 17β(H),21α(H) 28,30-bisnormorethane. Biohopanes were identified in trace quantities in Sharkansk oil that is showing its insufficient maturation. These data are contradicting sterane maturation coefficient (table 1) – its value is close to saturation. Sterane maturation coefficient is hightened due to high degradation level, as far as due to bacterial attack first to be assaulted are R-epimers of steranes.

Table 1. Biomarkers of Precambrian organic matter.

Area	Bitumen	Areas, wells - depth	Terpanes			Steranes		
			T_s/T_m	H_{29}/H_{30}	$\sum_{tri}/\sum_{penta}$	C_{27}:C_{28}:C_{29}	$^{Dia}/_{reg}$	K_{m2}
		r. Maya - R	4.2	1.1	2.6	Absent	-	-
		Kuyumbinsk - 1	0.761	0.61	0.35	34:28 :38	0.24	0.80
		Yurubchensk	0.85	0.70	1.31	13:17:70	0.3	0.85
	OM	Kuyumbinsk 205/29-R	1.13	0.68	0.25	33:24:43	0.49	0.60
		"-" 206/9 - R	0.58	0.91	0.12	31:23:46	0.53	0.64
East-European Platform	OM	Middle-Njaftinsk 2605 - R	0.51	0.8	2.4	49:25:26	1.8	0.8
		Gavrilov Yam 2543 - V	0.24	0. 5	0.1	23:12:65	0.9	0.4
		Gavrilov Yam 1805 - V	0.31	0.82	3.5	34:33:33	0.9	0.74
	Bitumen	Scharkansk - V	0.75	0.47	0.43	4:8:88	0.16	0.67
		Storogevsk - R	1.0	1.0	4.0	45:26:29	1.7	0.67

Storogevskaya well (Mezensk syncline) revealed dark-brown hard asphaltite in Uftugsk sediments, Late Riphean, filling fissures and cavities. Judging biomarker characteristics initial

OM of this bitumen is connected to marine source rocks typical for Phanerozoic OM – prevailing of sterane C_{27} (Table 1). Such distribution is typical for OM of the lower part of Riphean strata. Judging to hightened concentrations of tricylcic HC`s – cheilantanes, with prevailing of C_{23} ($^{tri}/_{penta=}4$) we could suppose biocoenotic differences in OM composition of different parts of the platform. Siberian platform is marked out by abundance and diversity of all types and classes of naphtides: hypergenic -maltha, asphalts and asphaltenes, thermally-metamorphic –kerites, anthrazolites, filtration-migrationary -asphaltenites, responding to asphaltites and kerites. The largest asphalt shows are dated to the northern side of Anabar anticline where they are impregnating Mukunsk sandstones.

Aldan anticline area and Aldan-Majsk trough are characterized by maltha, asphalts and asphaltite shows in Riphean, Vendian and Cambrian sediments. Naphtide extracted from Riphean sandstone corresponds to the class of asphaltes; its component composition is: pyrobitumen-44%, waxes-30%, oils-26%. Steranes are absent with sharp prevailing of cheilantanes in triterpane composition. Prevailing of tetracyclic HC`s is peculiar to many Precambrian oils of Eastern Siberia. Naphtide is characterized by high biodegradation level testified by absence of steranes, low hopane concentration with maximum on C_{27} (Ts), absence of C_{35}-C_{33} hopanes; biochemical oxidation of homologic hopane row proceeds according to the scheme $C_{35}>C_{34}>C_{33}>C_{31}>C_{30}$. Naphtide is characterized by high maturation level ($^{Ts}/_{Tm}$=2,7). It is Precambrian by oil age, although time of its transformation into naphtide is not possible to determine. Initial oil could be oxidized as at the end of Proterozoic age as well as in Phanerozoic. Less studied is the group of bitumen observed outside of the hypergenetic zone representing products of filtrating-migrationary group – so called asphaltenites. Soluble naphtides of “out-hypergenetic” zone – asphaltenites represent heavy residue of the oils remained on the spot after migration of lighter oil fractions. Such naphtides are met in a row of wells of Irkutsk amphitheatre. Some sections of Kuyumbinsk area are characterized by presence of inclusions of black anthracite-like insoluble naphtide related to the group of asphaltenites/kerites. These asphaltenites are apparently representing residual non-migrationary part of oil that suffered supplementary catagenic influence afterwards. Judging to naphtide composition and geological situation we can state that its formation time is Late Riphean and/or Late Vendian.

Determination of genetic connections between OM of the source rock – initial oil - bitumen will be favorable for solving the problem of conditions and formation time of Precambrian oil deposits of Siberian and East-European platforms.