

**MODEL OF BEHAVIOR OF MICROORGANISMS, UTILIZING COMPLEX HYDROPHOBIC SUBSTRATES IN FLUID,  
DEVELOPED ON THE BASIS OF 3-D COMPUTER RECONSTRUCTION OF SERIES SECTIONS**

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**Background:** Peculiarities of microbial exocellular structures and their role in utilization of oil hydrocarbons are poorly known. 3-D computer reconstruction of series semi-thin sections was used to make a model of a microbial consortium behavior during utilization of complex hydrophobic substrates in fluid.

**Objectives:** It was planned to study the structure of exocellular components; localize exopolysaccharides and catabolic enzymes of initial hydrocarbon oxidation; make 3-D reconstruction of system "water phase - cells - oil".

**Methods:** Electron- and immune cytochemical methods to reveal polysaccharides and oxidative enzymes; 3-D computer reconstruction of series semi-thin sections of oil-degrading bacteria *Rhodococcus* sp. S67 and *Pseudomonas putida* BS3701, and yeasts *Candida*, *Torulopsis*, *Schwanniomyces*.

**Results:** All these microorganisms secreted a significant quantity of the substance from which a network of vesicular structures and films was formed. The latter contained polysaccharides and enzymes participating in oil hydrocarbon degradation. Some yeasts undergone a substrate-dependent modification of cell walls that yielded "canals" associated with oil hydrocarbon utilization. Cytochrome  $\delta$ -450 was located on exocellular components and inside "canals".

**Conclusions:** 3-D computer reconstruction of series semi-thin sections of bacterial associates showed that exopolymers could organize culture medium in the form of a network of "trophosomes", granules whose envelopes served matrixes for oxidative enzymes. A model showing the behavior of microbial associates during utilization of complex hydrophobic substrates (oil hydrocarbons) in fluid was developed.

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