

THE DEEP SEA BIOSPHERE: MICROBES IN THE MUD

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Geochemical data from the Ocean Drilling Program and the Deep Sea Drilling Project provide some of the earliest direct evidence of an extensive microbial biosphere beneath the ocean floor. This biosphere is significantly larger than previously thought, and recent estimates suggest that it may account for 10% to 30% of the total biomass on Earth. ODP Leg 201 made history as the first expedition devoted exclusively to determining the extent, distribution, and intensity of microbial activity in deep-sea sediments. During this expedition, the most extensive biogeochemical and microbiological data set in ODP history was developed by integrating information from: direct microbiological assays (e.g., cell counts, enrichments, molecular methods) to identify specific organisms; measurements of sediment/lithologic properties; and analyses of pore fluid chemistry. Porewater geochemical profiles showing distribution patterns and concentrations of key electron acceptors, nutrients, and metabolites in deep-sea sediments were critical in identifying biologically active zones and specific metabolic styles such as Mn/Fe reduction, and methane oxidation. By combining these datasets, important new insights are being gained into the feedbacks between microbial activity and sediment/porewater chemistry, and the size of the global biomass. Dr. Blake is a biogeochemist who sailed on ODP Leg 201 as an inorganic geochemist.