

techniques to locate enemy artillery and several of them, on both sides, successfully transferred the military applications to oil exploration in the 1920's. Gravity and seismic exploration were both so spectacularly successful in the 1920s that several practitioners felt the need to establish a professional society devoted entire to this new discipline. Thus, the Society of Exploration Geophysicists was formed in 1930. Geophysics now ranks as one of the world's most sophisticated and data-intensive disciplines. It has long ranked among the heaviest users of supercomputers and, incredibly, this is likely to increase as new and astonishing visualization techniques become adopted.

## **AMERICAN PETROLEUM INSTITUTE PROJECT 43 AND THE ORIGIN OF MODERN PETROLEUM MICROBIOLOGY**

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Microbial activity is known today to have significant positive and negative impacts on the petroleum industry. From a beneficial perspective, microbial activities have been used to prospect for oil, recover oil from subsurface reservoirs, biosynthesize edible proteins, and remediate petroleum-contaminated soil and water. Detrimental activities include the corrosion of iron and steel, the plugging of reservoirs, the degradation of drilling fluid additives, the contamination of fuels, and the deterioration of asphalts. In 1942, API Project 43 was initiated with the assistance of three major university research groups and was funded via private industry. Fueled by the WWII war efforts, the aims of the project were to investigate the roles of physical, chemical and biological forces in the transformation of organic material into petroleum. Basic studies on microbial activities related to petroleum recovery and degradation were directed by marine microbiologist Dr. Claude ZoBell at Scripps Institute of Oceanography and the results published extensively in journals and oil industry publications between 1942 and 1954. Studies by ZoBell's group established the presence of bacteria in recent and ancient sediments, in oil field fluids recovered from great depths, and living at extremely high temperatures and pressures. Specific bacteria, such as sulfate-reducing bacteria, were found to be instrumental in liberating oil from oil-bearing sedimentary rocks by dissolving carbonates, producing detergents, and decreasing the viscosity of oil. In addition, the ability of bacteria to degrade hydrocarbons was shown to be relatively commonplace, a characteristic that has been widely exploited in the bioremediation of accidental oil spills. These and other accomplishments of Project 43 will be discussed in terms of our current understanding of the field of petroleum microbiology.