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Potential of marine bacteria in enhanced bioremediation

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Abstract

Global industrialization has resulted in a widespread contamination of the environment with constant addition of organic and inorganic wastes, either via natural processes or through human activities. These contaminants include excess nutrients, sewage and heavy metals, as well as synthetic organic compounds such as pesticides, polychlorinated biphenyls, tributyltin, and polycyclic aromatic hydrocarbons, etc. Bioremediation, a relatively new option among the emerging technologies, turned out to be economically viable, environmental friendly and value added process that could be applied for sensitive environments like wetlands, where conventional techniques are too disruptive. Marine environments are one of the most adverse environments due to their constantly varying physicochemical characters. Marine bacteria, owing to their continuous exposure to such environmental conditions possess complex characteristic features for adaptation and are more suitably adjusted to most of the adverse conditions. Therefore, many marine bacteria have the potential to be utilized in bioremediation of recalcitrant chemicals through precipitation, volatilization, physical exclusion of electronegative components in membranes and extracellular polymeric substances, energy-dependent efflux systems, intracellular sequestration with proteins, enzymatic degradation, and formation of biofilm, etc. The advantage of using marine bacteria for bioremediation *in situ* is the direct use of organisms without any considerable genetic manipulation. Perhaps the best-known example of such bioremediation took place during the cleanup of the *Exxon Valdez* oil spill, when fertilizer was used to enhance the breakdown of oil by naturally occurring bacteria. The application of marine bacteria to environmental problems represents an area of potentially great importance, for both environmental and economic reasons.

Biography

Jaysankar De received his PhD in Marine Science from the Goa University (India) and did his doctoral research at the NIO (India) and GBF (Germany). He received the "Young Scientist" award at the 92nd Indian Science Congress in January, 2005. He did his postdoctoral research in Japan, USA, Sweden, and Armenia. He worked as a Scientist at the Vanevan Institute & Center for Ecological-Noosphere Studies in Armenia. He currently works as the Head (Dean) of the Biotechnology Department at the UNESCO Chair-LSIPEC, Armenia. He has several publications and a US patent; and serves in editorial boards of many reputed journals.