PROSPECTS
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PERSPECTIVES
Historically, India has been recognized as one of the leading manganese producing countries in the world. After Independence, a picture has started emerging that the Indian manganese ores are slowly losing grounds in the world export market. The reasons were given as highly competitive pricing due to modern mechanization techniques by countries showing a rising trend in manganese export. Along with this, it can not be denied that the countries such as USSR and Ghana have emerged in the export market, producing massive quantities of these ores. New trends, such as biotechnology are being constantly explored by developed nations such as Australia, Italy and Greece. The change of pattern in the export trade is certainly hurting the country and has resulted in closure of several mines. In Goa, one of the producers of this commodity, life expectancy of many of these mines has been fixed as next ten to fifteen years. Moreover, there are large deposits of low grade ores (lower oxides of manganese) present in many parts of India. If the ores have to be conserved and exploited wisely without disturbing the environmental situations, there is no other alternative than using the new biotechnological advances.

In the present studies, work has been initiated on settling of suspended particles from washwater of a manganese
ore washing plant. This can not be directly called benefi-
ciation or upgradation of the mineral. However, this is
the first step where a mining organization and end-user
of this technology, has come forward to allow us to use
the microbiological techniques, at their site. There
could be many objections and hesitancy on the part of
the mining organization, although use and benefits of
this technology has been stressed through organization
of many colloquia, seminars, lectures and training courses
specially arranged for the mining fraternity of India
since 1972. For instance, in a place like Goa, Workshop-
cum-demonstration and lectures were held in many mining
towns. Notable among the courses held were the UNESCO/UNIP/
ICRO Course in Geomicrobiology in 1982 and a 3-Day Workshop-
cum-Demonstration meeting for top executives of mining
organizations, in 1987. The common fear that such micro-
organisms would cause environmental pollution was allayed
through the experimental findings of these studies, which
was also corroborated by the State Public Health Laboratory,
independently. It was also shown that the microorganisms
could be generated in desired quantities at the site using
available material and costly ingredients could be replaced
by available products at the site e.g. substitution of
manganese sulfate by manganiferous clay. This should
give the necessary confidence to the mining organizations
that these are not exclusive processes as found in the realm of pharmaceutical industries which need expensive ingredients, sophisticated instrumentation and sterile facilities. It would be a logical expectation, therefore, that these organizations would be ready and willing to treat their material by advanced biotechnological means. There are definite possibilities of bioconversion of lower oxides of manganese into higher oxides for manufacture of dry battery cells and biological removal of phosphorus from high-phosphorus manganese ore in the manufacture of ferroalloys. These are welcome signs that such processes would no longer remain in the laboratory. It is conceded that no amount of discussions regarding energy saving or abatement of environmental pollution would help, as long as a process based on microbial technology is actually seen to be working at site by nearby mining organizations. Herein lies the value of the present studies and it is hoped that the technology would be picked up soon in this country.