Native Marine Isolates from Indian Ocean Nodules

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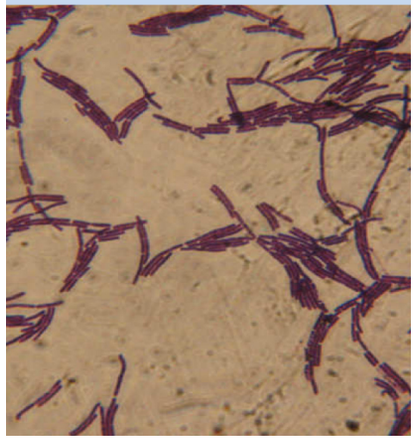
The marine isolates from sea nodules can be worthy catalysts to explore the possibilities of faster bioleaching of low index ocean nodules mined from Indian Ocean. The native microbes were isolated from Indian Ocean Nodules in Artificial Sea water Nutrient Broth (ASWNB) at pH 7.0. Two new and pure species were isolated after 12 rounds of culture purification on ASWNB Agar. They were termed as 7-BIOSN and α-BIOSN. Their microbiological and biochemical features are summarized below.

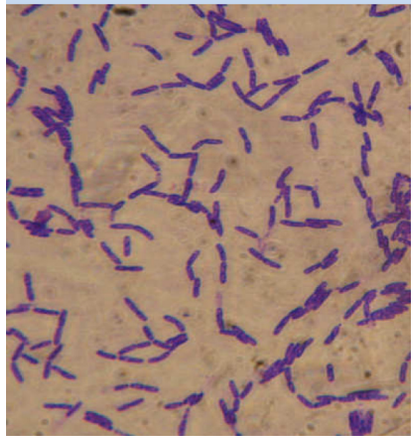
	7-BIOSN	**α-BIOSN**
Microscopic		
	Long chains of rod shaped cells Cells entangled in dense network Gram Positive Non Acid Fast Staining Non-Endospore forming Mesophilic	Short rod shaped cells Cells clubbed in pairs Gram Positive Non Acid Fast Staining Endospore forming Mesophilic
Biochemical		
Indole Test	+	+
Methyl Red Test	+	+
Voges Proskauer Test	-	+
Citrate Utilization Test	+	+
TSI Agar Test	Glucose fermenting	Glucose, lactose fermenting
Starch Hydrolysis Test	+	+
Gelatin Liquefication Test	+	-
DNase Test	+	+
Catalase Test	-	-
Oxidase Test	+	+
Salt Tolerance Test	Could not grow in >5% NaCl conc.	Could not grow in >7% NaCl conc.
Antibiotic Susceptibility Test	Resistant to Penicillin Resistant to Ampicillin, etc.	Resistant to Penicillin Sensitive to Ampicillin etc.
Generation time	1.3 h	0.7 h

Table 1. Microbiological and Biochemical Features

7-BIOSN



α-BIOSN



Figures 1 & 2. Two isolates from Indian Ocean nodules capable of metal oxidation from its sulphides and oxides

(Under Oil Immersion 1000X Magnification in Phase Contrast Microscope)

The pure isolates would be molecularly characterized for phylogenetic homology and subsequently tested for toxicity on metal ions (Cu, Ni, Co, Fe, Mn) for applications in bioleaching.

The Isolated species from sea nodules were tested for metal toxicity evaluation on various concentrations of synthetic salts of copper, nickel and cobalt. It was found that both species exhibited good resistance towards 1000 ppm Ni (II) concentration, whereas resistance towards Cu(II) and Co(II) could only be seen at a metal concentration of 100 ppm.

Metal ion	**Cu**		**Ni**		**Co**	
Concentration [ppm]	α-BIOSN	7-BIOSN	α-BIOSN	7-BIOSN	α-BIOSN	7-BIOSN
10	R	R	R	R	R	R
50	R	R	R	R	R	R
100	R	R	R	R	R	R
500	S	S	R	R	S	S
1000	s	S	R	S	S	S

Table 2. results of sensitivity testing; R = resistance, S = sensitive

These values can be improvised on subsequent sub-culturing for definite applications in bioleaching of low-index sea nodules and pose a promising alternative technology for the future.

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