Ikner Kartchner Microbiology Abstracts

TI: Analysis of slime deposits on fiberglass surfaces in Kartchner Caverns.
AU: Ikner-L-A {a}; Neilson-J-W {a}; Maier-R-M {a}
SO: Abstracts-of-the-General-Meeting-of-the-American-Society-for-Microbiology. [print] 2002; 102: 311-312.
PY: 2002
MT: 102nd General Meeting of the American Society for Microbiology, Salt Lake City, UT, USA, May 19-23, 2002
LA: English
AB: Background: Kartchner Caverns, discovered in November 1974 in the Whetstone Mountains of southern Arizona, is a wet "living" cave as carbonate features continue to grow due to percolating waters from the surface. In an effort to maintain Kartchner Caverns as a living cave, it has been carefully developed and access to the cave, which was opened to the public in 1999, is restricted and supervised. Fiberglass surfaces, installed to partition sections of the cave including construction and maintenance work areas, have developed a slimy growth. The slime returns even after washing of the fiberglass with bleach solution. Objective: The objective of this study was to identify the microbial population(s) responsible for the slime production and to determine whether this population was indigenous to the cave or was brought in during development of the cave. Methods: Samples of the slime were collected aseptically by swabbing, and a variety of bacteria were subsequently isolated on a minimal heterotrophic medium (R2A). Repetitive Extragenic Palindromic Sequence (REP) and 16s PCR methods were performed to characterize the organism(s) responsible for the slime production. Results: Sequencing and BLAST analyses have identified four of eleven isolates obtained as Bacillus sp., Sphingomonas yanoikuyae, Rhizobium sp., and Staphylococcus sp.. Conclusion: Preliminary evidence suggests that the slime-producing microorganism(s) are bacteria that are indigenous to the cave. This information will be used to design maintenance strategies for cave preservation.
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TI: Microbial Diversity in Kartchner Caverns.
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MT: 103nd General Meeting of the American Society for Microbiology, Washington, DC, USA, May 18-22, 2003
LA: English
AB: Kartchner Caverns State Park, a living cave system opened to the public in 1999, is located in the Whetstone Mountains of SE Arizona. An investigation was initiated to evaluate fiberglass surfaces installed within the cave that had developed a problematic slimy biofilm. Eleven unique bacteria were isolated, four of which produced slime. All

eleven isolates were determined to be indigenous cave dwellers because of concurrent isolation from true rock surfaces elsewhere in the cave. The objective of this study was to continue this investigation, focusing on the microbial diversity of the Kartchner Caverns cave system. We are identifying isolates from the true rock surfaces to better understand the microbial diversity of the cave system. Further, we have identified the likely property associated with the fiberglass (the paint coating) that enriches for the slime-producing isolates and are testing why the paint enriches for slime-producers. One hypothesis is that the paint coating on the fiberglass serves to select for isolates capable of excessive EPS production for protection against the toxicity of the paint. A second hypothesis is that the paint serves as a selective C source for the slime producers. True rock isolates were identified by grouping all of the isolates using Repetitive Extragenic Palindromic Sequencing (REPS). Each unique isolate was then subjected to 16s rDNA-PCR for amplification, and the product was sequenced and identified using BLAST analysis. The impact of paint on the fiberglass isolates was evaluated by plating isolates onto Minimal Salts Medium (MSM) with a 100% acrylic paint overlay at 10,000, 1000, and 100 mg/L. Thirty-nine unique isolates have been isolated from the true rock surfaces and are being identified. Seven of the eleven isolates (including all four slime-producers) from the fiberglass surfaces have exhibited growth on the MSM-paint medium. In summary, Kartchner Caverns exhibits a large diversity of culturable bacteria. Cave microflora dynamics are very sensitive to changes in the cave as illustrated by the uncontrolled growth of slime-producers found on fiberglass surfaces.