

Studies of Bacterial Communities from Four Windows Cave, El Malpais National Monument, New Mexico

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One of the striking features of some lava tubes is the extensive bacterial mats that cover the walls. In Four Windows Cave, these bacterial mats occur in the twilight zone adjacent to algal mats and in the dark zone. In an effort to phylogenetically characterize bacterial community members, we extracted DNA from wall rock communities, using a soil DNA extraction technique developed at Los Alamos National Laboratories. The DNA was purified, the 16S rRNA gene was amplified using PCR, amplification products were cloned, and thirty clones were sequenced in their entirety. Comparison of our sequences with those in the Ribosomal Database II revealed that the Four Windows bacterial sequences group with actinomycetes, *Acidobacterium*, *Verrucomicrobia*, *Betaproteobacteria*, *Gammaproteobacteria*, *Flexibacter*, *Planctomyces*, and *Leptospirillum/Nitrospira* groups. These results reveal a diverse community of bacteria and the presence of several novel bacterial species. To test whether these bacteria had lost their resistance to UV radiation, we cultured mat and surface bacteria on to R2A and subjected cultures to UV radiation in a biological safety cabinet. Bacteria cultured from these mats and surface soils on R2A medium showed a general trend in which microbes isolated from the lava tube were much more UV sensitive than the microbes isolated from the surface.