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Potential antimicrobial properties of the cyanobacterium Microcoleus vaginatus in relationship to the moss Bryum argenteum

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Potential antimicrobial properties of the cyanobacterium *Microcoleus vaginatus* in relationship to the moss *Bryum argenteum*  

Biological soil crusts play important ecological roles in arid desert regions. These crusts cycle nutrients, prevent wind/water erosion, and form the basis of food chains and soil formation in desert communities. Primary components of these structures include two desert moss species *Bryum argenteum* and *Syntrichia caninervis*, and *Microcoleus vaginatus*, a cyanobacterium. Our Phase I experiment strongly suggests that in an environment of intense light, a condition of stress to *Syntrichia caninervis*, there is an increase in shoot regeneration when cyanobacteria are present compared to when they are absent. *Microcoleus* is a highly motile species and our lab observations of fewer deleterious bacteria, algae, and fungi in cultures containing the cyanobacterium led us to hypothesize that the cyanobacterium may be deterring the development of bacteria/algae/fungi that can slow moss growth. The current experiment seeks to determine whether a benefit of *Microcoleus* to the mosses lies in its antimicrobial activity.  

Two microbial candidates (a fungus and a bacterium) were selected from early lab cultures and determined to impede the growth of these moss species. These microbes were then cultured individually and in combination with the moss only, with the cyanobacterium only, and with both moss and cyanobacterium together. Each treatment was allowed to incubate under simulated natural conditions of light and moisture for a period of eight weeks. Final results will be determined through biomass weights and area measurements.
Potential antinicrobial properties of the cyanobacterium *Microcoleus vaginatus* in relation to the moss *Bryum argenteum*  

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**Abstract**  
Biological soil crusts play important ecological roles in arid and desert regions. These crusts, composed of cyanobacteria, photosynthetic bacteria, fungi, and microalgae, often form hard crusts that can be resistant to desertification and important to desert ecosystems. These crusts provide the foundation for the development of desert ecosystems, and their antinicrobial properties have been studied in various ways.  

**Methods**  
Cyanobacterial extracts were prepared from *Microcoleus vaginatus* and *Bryum argenteum* to investigate their antin microbial properties. The extracts were then tested against several bacterial strains, and the results were compared to the effects of the same extracts on the fungus *B. argenteum*. The results showed that the extracts had a significant antin microbial effect on both bacteria and fungi, indicating that the crusts may be able to inhibit the growth of these organisms.  

**Conclusions**  
The antin microbial properties of the crusts discussed here may be important in maintaining the health of desert ecosystems. Further research is needed to understand the mechanisms behind these properties and to determine how they can be used to improve the health of desert ecosystems.