Antibiotic Resistance Genes Identified in the Thermal Hot Springs National Park Public Water

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Hot Springs, Arkansas is a tourist town known for its geothermal hot springs, which contain microbial thermophiles that thrive at high temperatures. These springs have several sources of water used by the public for drinking and bathing. This project tested for the presence of antibiotic resistance genes (ARGs) in these sources. If present, these ARGs could transfer to pathogenic bacteria and result in increased antibiotic resistance in the environment and possibly negatively affect host organisms including humans. In this project, water and algae were collected from nine sources in Hot Springs, including spring and fountain sources. Most samples were also filtered to concentrate DNA isolated from water and algae. Polymerase chain reaction (PCR) was conducted on the water and isolated DNA, which required optimization of temperature and concentrations of DNA and buffers. Gel electrophoresis was used to visualize the amplified DNA. Though the spring sources had more ARGs than the fountain sources ($p=0.008$), two of the four fountains used for public drinking water still had ARGs. The spread of ARGs in our environment could contribute to multi-drug resistant infections that may not be treatable. Antibiotic resistance in drinking water deserves more attention to support public health. Future studies should determine the prevalence, types, and severity of antibiotic resistance in these and other drinking water sources.

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