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Weathering Degradation of Anthropogenic Formations in Marble and Granite

The idea for my project originated during research for a history project; I visited a gravesite with a deteriorating tombstone at a cemetery and wondered why it was in such bad condition. Other anthropogenic formations, including Mount Rushmore and the Tomb of the Unknown Soldier, have also been affected by weathering. Thus, I chose to examine the effect that weathering has on anthropogenic (man-made) formations such as these carved from granite and marble. Will more acidic rain in highly polluted areas hasten the degradation, and can a sealant be used to protect the natural stone? I hypothesize that acid rain will cause faster deterioration of both marble and granite, and a sealant will slow the process. My independent variable was the acidity of the water. My dependent variables were the mass of the rocks and the number of gauges etched in the rocks. My controlled variables were the identical fountains, the sealant type, and the rocks themselves. I measured the mass each day, and the etching on the stone was measured by comparing rubbings of each stone taken prior to the experiment with those taken after the experiment. In all cases, more etching occurs on each stone. The results of the experiment confirm my hypothesis. The acid rain did degrade the stones more quickly. The sealant did slow the degradation. To my surprise, the sealant was less helpful on marble than it was on the granite. Thus, future research should be done to find a more effective sealant for marble.