Summer Research with Calvin College

Brookhouse-DuBois

From the very beginning, the plan was to test water filters by making up bacteria, viruses, and cysts. These three biologicals were put into water before being filtered through experimental biosand filters. This way the filters could be tested on how effective they were at purifying water. To do this bacteria, viruses, and cysts had to be grown so that there would be enough biologicals for multiple experiments. A harmless strain of E. coli was chosen and grown for testing bacteria. It was a simple concept, grow the bacteria, put a certain amount it in water, and filter it to see how much came out. Next bacteria phage, also known as viruses, was needed so that the water filters could be tested on their ability to clear any phage that survived in water. Turns out quantifying viruses is harder than it sounds. To do that something needs to show were the virus has been and how much virus was present. As it turns out bacteria can help with that. So equally harmless yet antibiotic resistant E. coli was purchased and grown to be used as a way to show were the phage had been. This strain of E. coli was put into water samples so that the phage could infect it and not the first strain of E. coli. Once the antibiotic resistant E. coli and the phage had been mixed, they were poured onto a petri dish with antibiotics so that nothing else would grow but that strain of E. coli and the phage. This allowed the E. coli to grow and then rupture after it had been infected by the phage. This rupturing made a little spot on the TSA plate and those spots could be quantified to show how much phage was present in the water. Finally, the filters needed to be tested for their ability to clear cysts such as giardia and other water born disease. To do this, real cysts could have been run through the filters in test water that were grown in the lab but the same experiment could be done with fluorescent beads that are easier to detect via microscope. So an exact amount of the fluorescent beads was added to some test water and run through the filters. Then the extracted water from the filters was poured onto a special filter that would

caught the beads. Once all three biologicals assays were run separately in the lab, all three we're mixed into large amounts of test water and run through the filters being tested.