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Bacteria and Viruses In Freshwater: A Historical Record of Past Pollution

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INTRODUCTION

Today numerous bacteria, viruses, and other microorganisms occupy fresh water environments. The majority of these microorganisms are beneficial, however, about 10 percent are very harmful. These harmful microorganisms, also known as pathogens, can cause sickness to humans if consumed. Some bacteria can live in large numbers in the intestine of warm and cold-blooded animals. These are called commensal bacteria, which aid with the digestion of food. Faeces are composed of bacteria that are associated with fecal material of human and animals (Oram 2014). Fecal commensal bacteria are usually not pathogenic. However, they can become pathogenic when infected by bacteriophages. Depending on what type of bacteria live in our freshwater ecosystems we can inform us of how polluted the sources are and where contamination is likely coming from. Most importantly, it can help to improve water quality and prevent future contamination and pollution.

This research was conducted on water sources from Kelvin Grove Fountain, Kelvin River, Loch Ness, and a pond near Fort Augustus known as Jenny’s Pond. Bacteria from each water source were isolated, gram stained, spore stained, tested using selective and differential media and lastly identified using PCR of 16s rRNA sequence. Also viruses were tested using bacteriophage plaque assay. With this knowledge, the level of pollution at each water source will be identified as well as specific bacteria that may be harmful to humans.

PURPOSE

The purpose of this research is to characterize the bacteria of fecal origin, and to attempt detection of bacteriophage in a local watercourse.

METHODS & MATERIALS

Growing Bacteria: Water samples were collected throughout 6 weeks from Kelvin Grove Fountain, Kelvin River, Loch Ness, and Jenny’s Pond. One bacterium found in the Kelvin River that was interesting was Chromobacterium violaceum. It is a gram-negative rod that is found in the freshwater water sources can inform us of how polluted the sources are and fecal coliforms such as E. coli. Even though plaques did not form using the other water sources, there is reason to believe that there are viruses in the Kelvin River. This shows that there are viruses in the water that can attack certain bacteria, however, not the bacteria that were identified. It also shows that there is a historical record of past pollution because virus need hosts to survive and fecal coliforms such as E. coli are most likely their host. Even though plaques did not form using the other water sources, there is reason to believe that there are viruses in Jenny’s Pond due to the fact that it is highly polluted.

One bacterium found in the Kelvin River that was interesting was Chromobacterium violaceum. It is a gram-negative rod that is found in the soil and water of subtropical areas (J. Lee, 1999). What makes this bacterium interesting is that it produces a natural antibiotic known as violacin. Violacin may be useful for treatments of colon and other types of cancer (Kumar, 2012). Chromobacterium violaceum was tested as an antibiotic source for the other isolates that were identified in this research. Sample 3, Corynebacterium esp were susceptible to the antibiotic as well as sample 7, which is unidentified.

REFERENCES


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