



The Effects of Human Activities and Water Pollutants on Microorganisms in the Canals of Babylon

Authors: Anna Glynn, Emily Demieri and Sneha Kumar

Teacher: Claire Birone

Babylon Junior-Senior High School



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Abstract

Many different species live in the Great South Bay and are affected by pollutants from boats such as Tributyltin. Microorganisms and shrimp were collected from several different locations in Babylon such as the Shore Road Docks and the Village Pool. DNA was extracted from the samples in a high school setting over the course of 3 days, however there was no DNA amplification. Several human errors could have taken place during the DNA extraction procedure during steps such as mixing, pipetting, and grinding. The mixing portion may have not been done fully as well as the grinding. During the pipetting process a possible error would be not pipetting the DNA in/out fully.

Introduction

There are many different species living in the Great South Bay including different types of diverse microorganisms. However, little research has been done as to what happens to the organisms when they are around docked boats. On Long Island, 500,000 boats are registered in the Great South Bay alone, and it is estimated that 30,000 to 50,000 boats are on the Bay on a summer day(1). Specifically in Babylon, the docks have an estimated 20 plus boats docked there regularly, which leads to idling boats with engines that are running in the canal that could potentially affect the microorganisms that live there. The boats emit pollutants which then end up in the water in the canal which will then end up in the bay.

Boats emit many pollutants into the water such as detergents, marine debris, acidic and alkaline substances and oil or fuel (Boating Pollution Impacts and Economics). These pollutants have negative effects on the water quality of the bays and canals where they are released. "Pollution makes marine animals less able to survive other stresses. This may affect fishing and other water uses" (Boating Pollution Economics and Impacts). Even small amounts of boating pollution can accumulate over time and impact the environment.

Not only could the pollutants in the water have negative effects on the microorganisms living there, but there could also be effects on humans. If people are fishing in an area of water with pollution and eating the fish that they catch they could become harmful to humans. One example of this is shellfish becoming contaminated with Tributyltin (TBT), which is still used in some paint used on aluminum hulls, outboard motors, and lower drive units. Oil and fuel found in polluted water also has negative effects on fish that can lead to negative effects on human health when eaten

The docks were used not only because boats are docked there regularly, but also because the pilings of the dock helped to pinpoint the location of the microorganisms found there. The two docks that were used in this project are the Babylon boating docks and the Babylon Pool docks. These two locations are 2.25 km away from each other(Fig. 1). The Babylon Pool docks do not allow boats to stop and keep the motor running in this area.



Fig.1
The pinpoints on this image are used to represent the locations at which the data samples were collected.



Fig.2
This is an image of microorganism NSH-007 collected from the babylon docks.

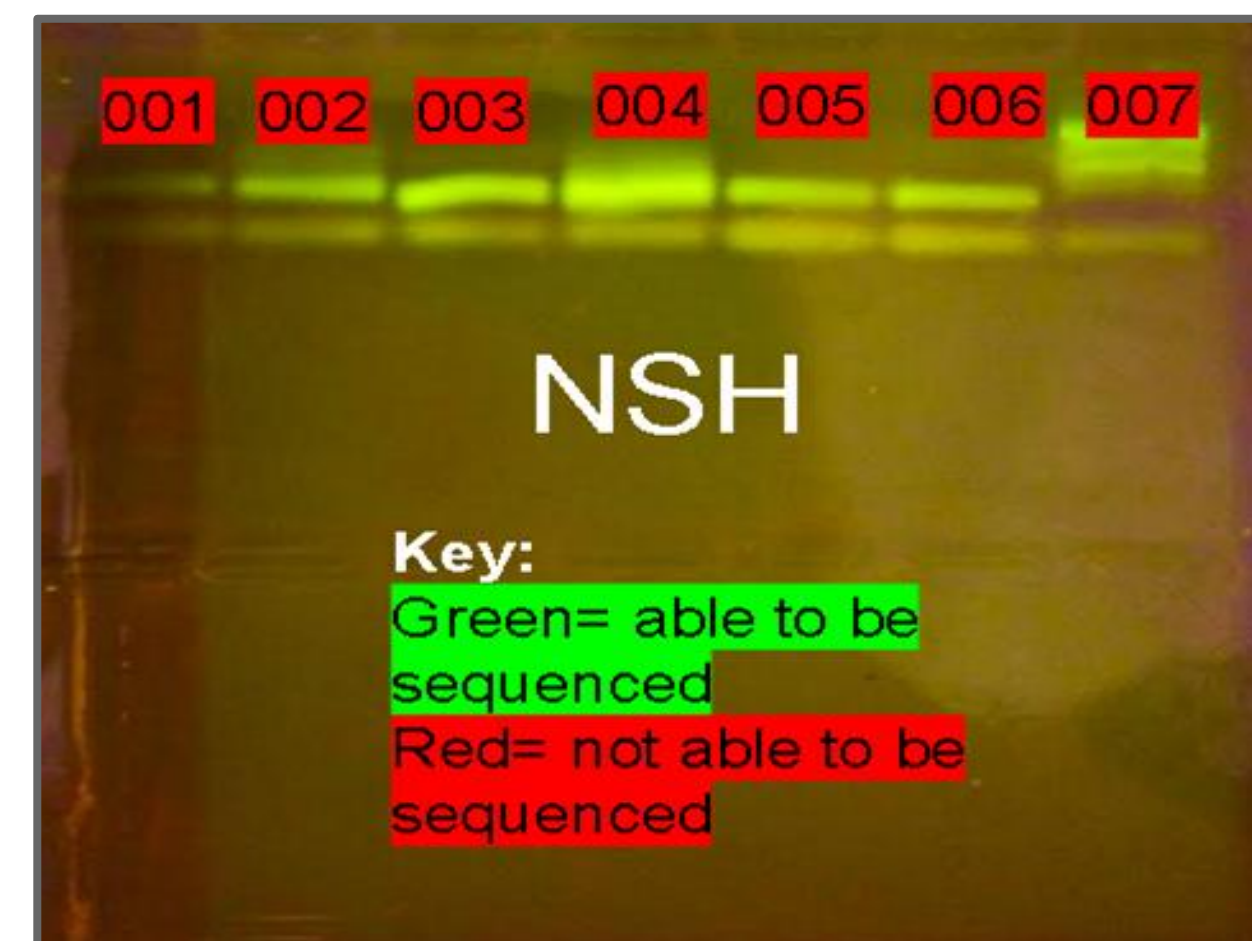


Fig. 3
This picture shows the gel, the samples could not be sequenced and the result was the primer dimer replicating itself.

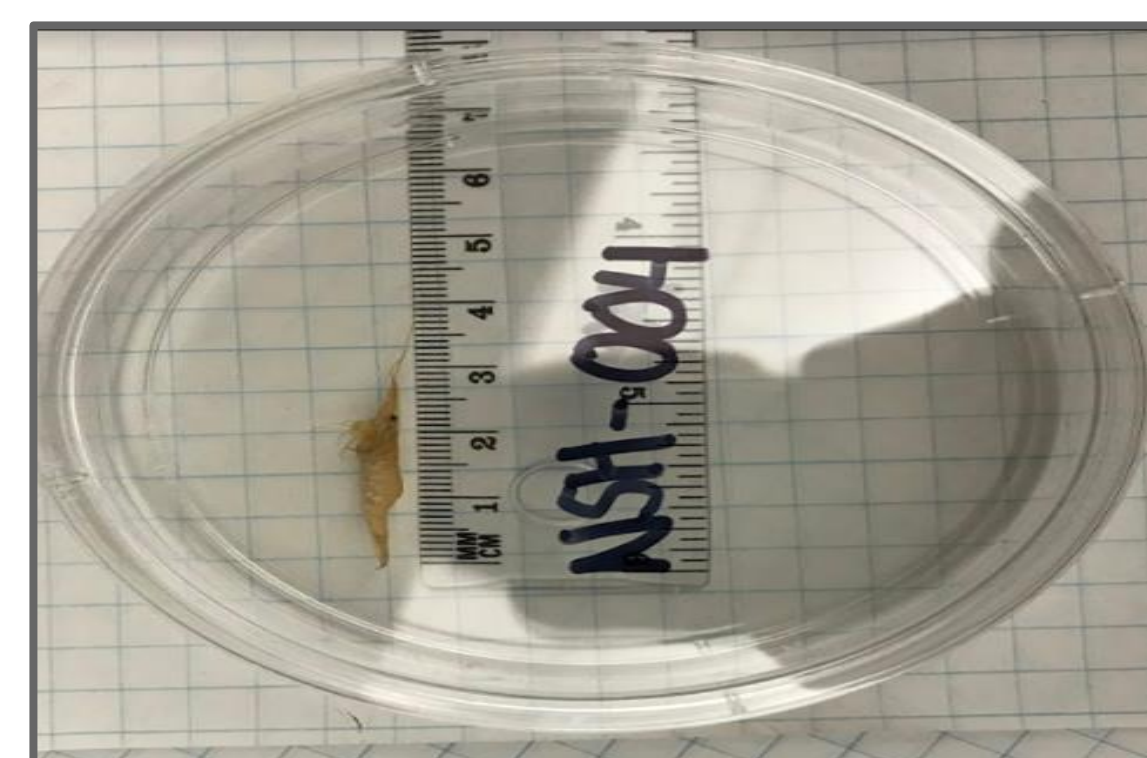


Fig.4
This is an image of a shrimp that was collected as sample number 004, one of 8 invertebrate samples collected at the Shore Road Docks.



Fig.5
This is a picture of microorganism NSH-006 that was found at the Babylon docks.

Methods

The microorganisms were collected by using a bag or cup to scoop water up from the surface of the canal. A microscope was used to look at the microorganisms collected and pictures were taken to accurately show what organisms were found.

All samples were kept in the Babylon Junior-Senior High School research room, identified, then were later kept in the freezer to keep them fresh and ready for the DNA extraction process.

To process the DNA, standard DNA extraction techniques and the equipment given to use by Cold Spring Harbor Laboratory were utilized. After being sequenced, the organisms' CO1 genes were compared to each other. Conclusions were drawn from these results to compare the biodiversity of microorganisms living in an environment with boating traffic and water pollution as compared to an environment with less water pollution on the South Shore of Long Island.

Discussion

Some of the samples collected were microscopic, therefore they could have gotten stuck in the pipet tip and the samples may have been lost in the first place. They also could have gotten stuck to the grinder and the samples could have never made it into the tubes. The samples may not have been mixed thoroughly enough in the mixing process. This may have resulted in an unsuccessful extraction. When transferring the supernatant to a fresh tube, it is possible that not all of it was transferred, leaving the DNA behind in the old tube. There are three main problems that could have gone wrong including not using correct measurements, leaving behind supernatant and/or pellets in tubes, DNA could have also been left behind in pipette tips. Overall, steps that could have been the cause of error include mixing, grinding, and pipetting.

References

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