

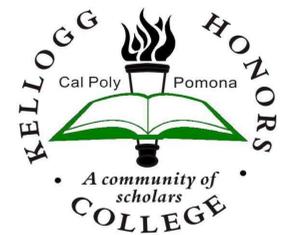
A Microscopic Evaluation of the California Polytechnic University, Pomona Duck Pond



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Abstract

Microscopic life plays a major role in any ecosystem. These lifeforms can have positive or negative effects on their environment based on their concentration and particular species. There are different organisms, like green algae and diatoms, that are good indicating factors of positive or negative pond health based on their concentrations in the water. However, there are other organisms, like cyanobacteria and parasitic life, that are associated with negative effects on pond health as well as the health of the animals in the surrounding ecosystem. The purpose of this experiment was twofold. The first goal was to evaluate the water quality based on the microorganisms identified in water samples. The second was to relate their prevalence to potential health hazards or health benefits on the wildlife and human populations around the pond. This experiment is meant to give a base assumption of pond health based on one factor. However, this experiment can lead to further research that can focus on a more diverse array of factors, like pH and metal content to name a few, to create a more encompassing picture of the health of the pond on the California Polytechnic University, Pomona campus.

Introduction

Ponds provide a valuable ecosystem to many different forms of life. In this case, the duck pond on the University of California Polytechnic University, Pomona's campus provides a home for many organisms. This includes vertebrate animals like turtles and fish, that were placed in these ponds, and ducks who come and go as they please while using the pond as a stopping point. This body of water is also home to microscopic organisms, some of which can be parasitic. In some cases these parasites may not be harmful depending on whether or not they are species specific and the symptoms they can cause. In veterinary medicine, for example, with some parasites, like giardia, there is a growing trend of not treating the infection if no symptoms are present. The goal of this experiment was to evaluate the health of the pond by taking a closer look at the microscopic life, particularly parasites, residing in the pond ecosystem.

Assumptions

Based solely on aesthetics and transient wildlife the assumption going into the experiment was that there would be a multitude of parasitic life in the pond ecosystem. The water of the pond appears muddy and there seems to be excess algae. There is also a minor amount of litter that can be found in the pond. Due to the fact that the pond is open to various forms of wildlife including, but not limited to, ducks and stray cats it seemed plausible that there could be parasites in the water from these sources if any of their contaminated feces ran into the water of the pond. For these reasons the hypothesis of this experiment was that there would be a high amount of parasitic life found upon examination of the pond contents.

Experimental Outline

The experiment was conducted during winter quarter. There were six sample collections once a week beginning on January 27, 2016 and ending on March 9, 2016. Each week one pond water sample was collected and on weeks one and four duck fecal samples were collected. The first week no slide stain was used to view the slide contents; however, every week after that utilized an iodine stain. During collections the weather and water temperature was noted to determine if there was any relevant correlation to the organisms observed. Each week a normal wet slide was prepared along with a fecal float slide. The fecal float slide was used with the intention of concentrating the sample by allowing the higher specific gravity of the Fecasol to aid the parasitic eggs in floating. The slides were looked over using the 10 objective, and the 40 objective was used to get a closer look at any possible parasitic life as well as other microscopic organisms found in the samples. After the weeks samples were taken, various internet searches and book sources were used to identify the organisms in the samples.

Findings

Name	Organism	Name	Organism
Cyanobacteria		Aneumastus	
Euglena		Rotifer	
Giardia		Scenedesmus	
Pandorina		Water Flea	
Pediastrum		Toxocara sp.	
Pollen		Baylisascaris sp.	

Discussion

Throughout the weeks various organisms were found and identified. These included cyanobacteria, euglena, giardia, pandorina, pediastrum, pollen, diatoms (mostly raphe), rotifers, scenedesmus, water fleas and *Toxocara cati* or *Baylisascaris sp.* Regardless of the temperature of the day the water temperature was between 61°F and 65°F. The slight differences in temperature did not seem to have an effect on the organisms found on any specific day. To begin each organism will be identified as positive, negative, or neutral in relation to their effect on the health of the pond and the surrounding ecosystem.

Cyanobacteria can be classified as negative. This blue-green algae is capable of releasing toxins into the water that could affect the different vertebrate life forms living inside and around the pond. To avoid the presence of this organism it is important to avoid algae blooms. Next, euglena would also be considered negative on the health of the pond. Euglena presence points to the formation of pond scum. These organisms can take over a pond and are responsible in many cases for turning the surface of the water green. Pandorina, pediastrum, and scenedesmus are three other forms of green algae. In small amounts these organisms would represent a positive effect on the pond health because they have oxygen producing qualities. However, because the algae population in this pond has skyrocketed they become a negative contributor on the pond health. By over producing they, like euglena, contribute to the presence of cyanobacteria which is a health hazard for the different forms of life in and around the pond. The next organism, giardia, is also categorized as having a negative impact on pond health. This is a parasitic organism that has the potential to cause diarrhea in many different animals, including humans, if ingested. Also the possible *Toxocara sp.* (presumed *cati*) or *Baylisascaris sp.* that was found would be negative when it comes to the evaluation of pond health. It is referred to as possible because it may be another species of the roundworm egg. The possible presence of this parasite could have a negative effect on the organisms living around the pond. For example, if a human were to accidentally ingest water contaminated with these eggs they could contract a serious disease from either of these possible organisms.

On the other hand, the presence of diatoms could be considered positive. This reasoning is twofold. They contribute to the food chain by being consumed by other organisms. They are also a very good indicator of water quality. These allow water quality to be crudely tested without expensive tests or equipment which is always a good thing. They also are very susceptible to the water changes that come about as a result of pollution. So while there may be some litter present in the pond it is not enough to kill off the diatoms which points to at least some measure of pond health. The presence of water fleas is also another positive indicator of pond health. They are a key stone species of sorts because they are a good indicator of the overall environment of the pond water. These creatures eat algae and provide food for other, larger organisms.

Conclusion

Overall it is difficult to determine the health of the pond and the surrounding environment by just taking in these microscopic factors. There are many other factors that contribute to pond health that could be tested to get a better, more well-rounded picture. However, based on only the evidence collected from the scope of this experiment, it is clear that some improvements need to be made to the pond. The main factors that need to be addressed are the overgrowth of algae and presence of parasitic life forms. After these factors are dealt with it would be beneficial to look at other aspects of the pond to further assess the pond health from that point. Also, it is important to note that just because other organisms, positive or negative to the pond health, were not seen does not mean that they were not present in the pond. The collection technique made it difficult to get more than a sliver of an idea of all the microorganisms that could be inhabiting the pond.