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ESS 474

Fall 2024

**Phytoplankton ID Lab**

Date: Friday September 27, 2024

Write up due: Wednesday October 2, 2024

The structure of photosynthetic phytoplankton populations in aquatic ecosystems is dynamic and constantly changing in species composition and biomass distribution. Changes in phytoplankton species composition and biomass may affect photosynthetic rates, assimilation efficiencies, rates of nutrient utilization, grazing rates, etc.

**Procedure**

1. Look at sample under dissecting microscope.
2. Transfer *one* drop of sample from the petri dish with a pipette to a slide, and cover it with a slip.
3. Set the slide on a compound microscope (x 40 recommended). Count and record all individuals in **Table 1.**
4. Repeat this 4 times.
5. For one slide, record all individuals in **Table 2.**
6. Answer summary questions and assemble a clean and polished final report.

Algae ID: <https://www.landcareresearch.co.nz/tools-and-resources/identification/freshwater-algae/identifications-guide/>

**Reference**

Wetzel, R. G. and G. E. Likens. 2000. Limnological Analyses. Springer, New York.

**Rubric**

|  |  |  |
| --- | --- | --- |
| Category | Description | Points |
| Tables | Table 1 and 2 are completed to the best of the student’s ability | 5 |
| Questions | All questions are answered with attention to detail and all statements are supported with reason and evidence | 8 |
| Overall quality | Submission is cleanly formatted and free of typos | 2 |
| **Total** | | 15 |

**Table 1:** Using the online keys provided, record counts of individuals.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Diatoms | Cyanobacteria | Eugleniods | Clorophyta | Dinoflagellates | Unidentified Phytoplankton |
| Slide 1 | 1 |  |  |  | 43 | 53 |
| Slide 2 |  |  |  | 4 | 25 | 32 |
| Slide 3 |  |  |  |  | 17 | 9 |
| Slide 4 |  |  |  |  | 21 | 14 |

**Table 2:** For one slide, identify all individuals to the most specific classification possible (probably order   
or family). For additional individuals that are the same as those already identified, just add to the count in   
the right column. Best guesses are okay. Just do the best you can and nerd out a little. Add extra lines as   
necessary.   
Slide 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Individual | Class | Order | Family | Species | Count |
| 1 | Zygnematophyceae | Desmidiales | Desmidiaceae | arthrodesmus | 4 |
| 2 | Peridinea | Gonyaulacida | Ceratiidae | Ceratium | 25 |
| 3 | Seisonidae | Paraseison | Seison |  | 4 |
| 4 | Zygnemophyceae | Desmidiales | Desmidiaceae | Xanthidium | 28 |
| 5 |  |  |  |  |  |
|  |  |  |  |  |  |

**Questions**

1. **In a few succinct sentences, describe the microscopic community you observed in the samples. Include how many phytoplankton groups were you able to identify. Also include what kinds (broadly) of phytoplankton you could identify and how you determined their ID.**

We observed a microscopic community of four types of phytoplankton, consisting mostly of Dinoflagellates and Xanthidium (Figure 1), but also including Arthrodesmus and Rotifers of the Family Seison. We determined the IDs of these species by referencing the LandCare Research Algal ID website and with the assistance of our Lab Professor and TA.

A microscope with a black arrow and a yellow object

Description automatically generated with medium confidence  
Figure 1: Xanthidium

Calculations done with provided R script and data shown below, Pulchritia used as stand in for Rotifer species as online review leads me to believe this is the correct species, but the LandCare database did not present it as an option:

A screenshot of a computer

Description automatically generated

1. **What was your Shannon index value? Is this considered high or low?**

1.080317

This is low, according to the provided materials Shannon typically ranges from 1.5 - 3.4, with higher values representing more diversity. Our result is below the typical range

1. **What was your Simpson index value? Is this considered high or low?**

0.6127385

This is not very high, as the upper limit is 1

1. **How do you think phytoplankton diversity might be different in other months of the year?**

I think that the diversity of phytoplankton would change seasonally as predator-prey cycles, temperature, wind, nutrient inputs, and water level change and as different species spawn. While dinoflagellates and green algae are abundant now, as the temperature cools and upstream sources of water-borne nutrients freeze another species may become more dominant.

1. **These samples were collected at 1 meter in depth at  ~7:00 PM from an eutrophic lake with Secchi Depth of 0.5 m. In a well written paragraph, hypothesize how changes in the aforementioned parameters (depth, time of sampling and trophic state) might impact the community assemblage you observed.**

The observed community assemblage could change significantly under altered conditions. A sample taken deeper in the water column, beyond the mixed layer as well as the photic zone, would likely have a much lower population of green algae. Time of day may have an effect on observed species as well, as some species can control their position in the water column and may be more abundant in mor direct sunlight than those present in the evening when the sun is low. In an oligotrophic lake, one would expect phytoplankton density and diversity to be lower than in the eutrophic example.