



The presence of a freshwater source affecting the biodiversity of Mushrooms

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Abstract

Mushrooms are decomposers and many mushrooms provide qualities that are beneficial to mankind. To find the biodiversity of mushrooms in the two areas we collected specimen from each area and then taxonomically and genetically identified them. After taxonomically identifying the mushrooms we found that the nature trail was more biologically diverse because it had eleven different species and the pond had seven different species. To gain more clarity on what the freshwater was doing we found four soil values from the two collection sites. After our findings we have concluded that freshwater decreases the biodiversity of mushrooms, the probable reason for this is the water negatively affecting certain components in the soil towards mushroom growth.

Introduction

Background of Mushrooms

- Mushrooms are fungi
- Mushrooms are decomposers and use their mycelium to get nutrients from dead animals or plants near them
- Mushrooms don't have absolute known habitats
- Many mushrooms contain beneficial qualities for human use
- Mankind has only found 10% of mushrooms on earth

Background of Project

- The two locations of collection for the mushrooms was the area around a freshwater pond and a wooded nature trail

Methods

Collection Procedure:

- Mushroom specimen were located in the two different areas of collection
- Mushrooms were then photographed when still in the ground
- Next the stem of the mushroom is cut or just completely uprooted from the ground
- Once removed from the ground the mushroom is bagged then labeled
- Then the mushrooms are photographed and measured in the lab
- Then the mushrooms are stored in the fridge

Barcode Procedure:

- First the DNA is extracted with the aid of a Chelex agent
- The extracted DNA was then amplified in the ITS gene using PCR
- The PCR tubes were then loaded in a Thermocycler and went through multiple cycles
- The PCR was then confirmed by the process gel electrophoresis
- The PCR was sent out to be sequenced
- After sequenced gene whiz was used to genetically identify the specimen

Amount of Mushroom Species

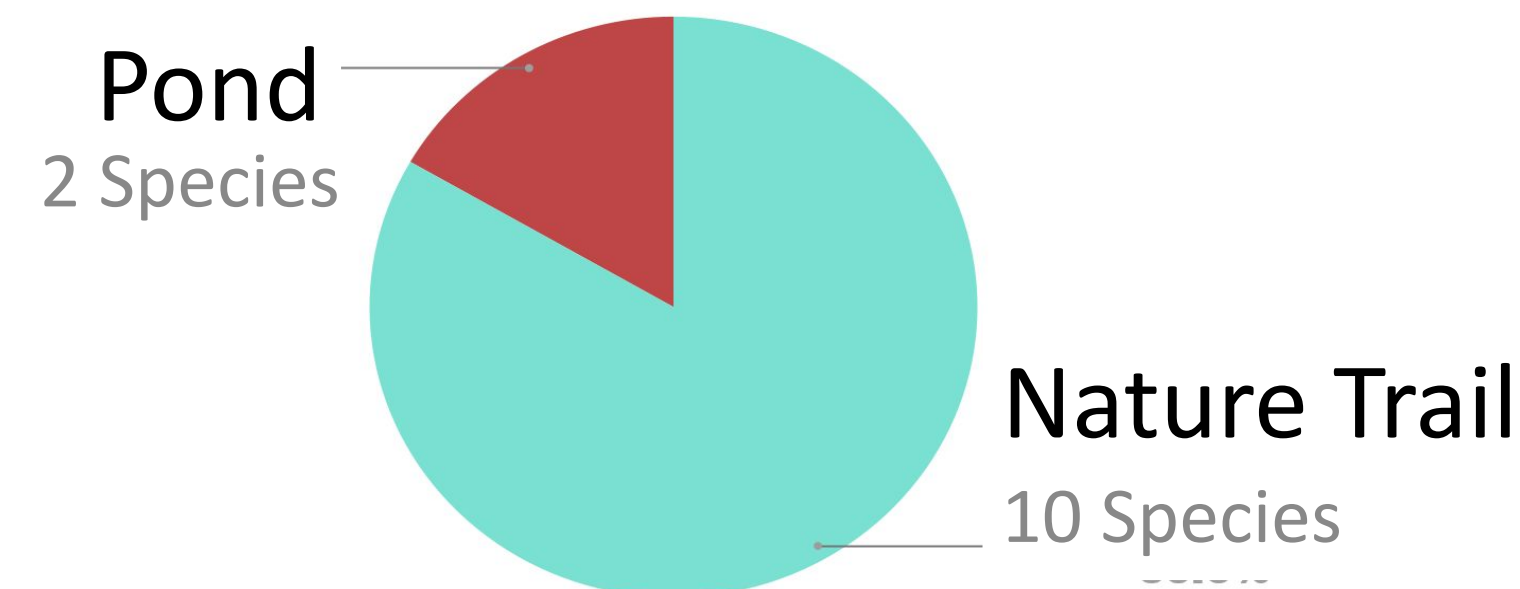


Figure 7. RapiTest soil tests
Photo Credit:



Map 1. Map of collection sites
Photo Credit: Google Maps

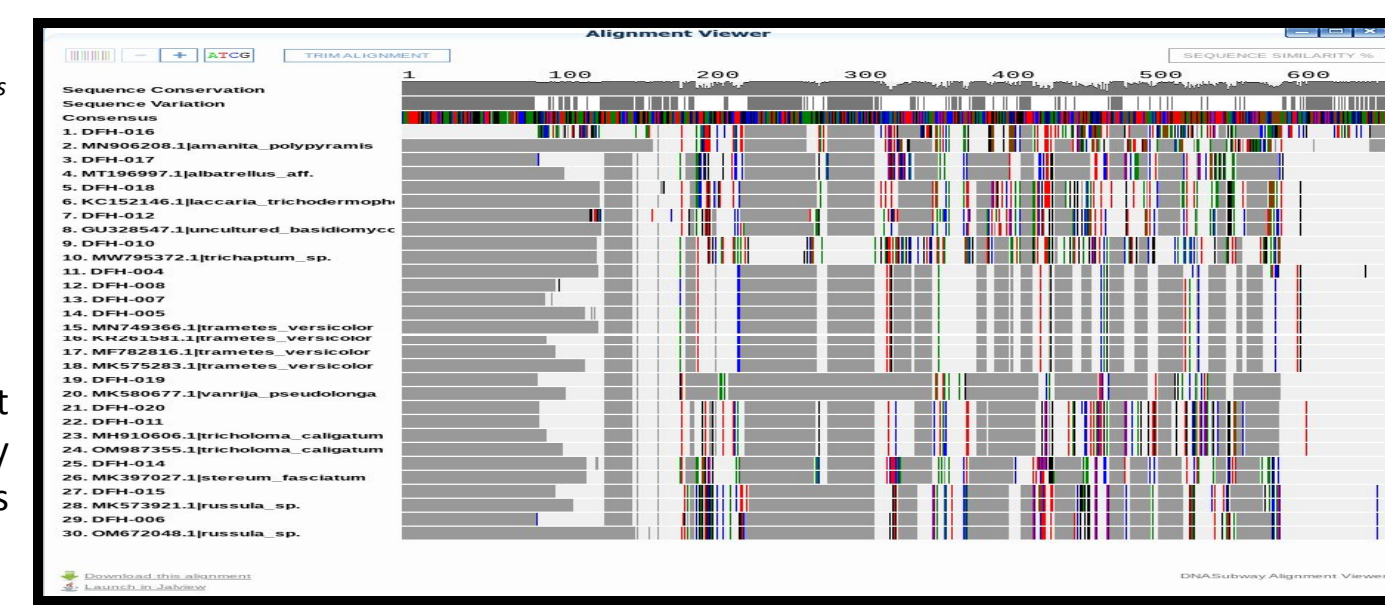


Figure 8. Alignment of all genetically identified species

Results

Species Number	Taxonomical ID	Genetic ID
1	Shaggy Scalycap/ <i>Pholiota squarrosa</i>	
2	Bleeding agaricus/ <i>Agaricus brunneofibillosus</i>	
3	Brown Mottlegill/ <i>Panaeolina foenisecii</i>	
4	Hen of the woods/ <i>Grifola frondosa</i>	<i>Trametes versicolor</i>
5	Hen of the woods/ <i>Grifola frondosa</i>	<i>Trametes versicolor</i>
6	Scarlet waxcap/ <i>Hygrocybe coccinea</i>	<i>Uncultured russula</i>
7	Chicken of the woods/ <i>Laetiporus sulphureus</i>	<i>Trametes versicolor</i>
8	Chicken of the woods/ <i>Laetiporus sulphureus</i>	<i>Trametes versicolor</i>
9	Jack-o-lantern mushroom/ <i>Omphalotus olearius</i>	
10	Molly Maze Polypore/ <i>Cerrena unicolor</i>	<i>Trichaptum</i>
11	Surprise Webcaps/ <i>Cortinarius semisanguineus</i>	<i>Tricholoma caligatum</i>
12	Meadow mushroom/ <i>Agaricus campestris</i>	<i>Basidiomycota cortinarius</i>
13	Mower's mushroom/ <i>Panaeolus foenisecii</i>	
14	Molly Maze Polypore/ <i>Cerrena unicolor</i>	<i>Stereum fasciatum</i>
15	Common Yellow Russula/ <i>Ochre brittlegill</i>	<i>Russula</i>
16	Shaggy Scalycap/ <i>Pholiota squarrosa</i>	<i>Amanita polypyraxis</i>
17	The sickener/ <i>Russula emetica</i>	<i>Albatrellus</i>
18	Deceiver mushroom/ <i>Laccaria laccata</i>	<i>Laccaria trichoderma phora</i>
19	Shaggy Scalycap/ <i>Pholiota squarrosa</i>	<i>Vinarija pseudolonga</i>
20	Orange milkcap mushroom/ <i>Lactarius aurantiacus</i>	<i>Tricholoma caligatum</i>



Figure 1. Mushroom Specimen: Hen of the Forest
Photo Credit: Students



Figure 2. Mushroom Specimen: Molly Maze Polypore
Photo Credit: Students



Figure 3. Mushroom Specimen: Orange Milk Cap Mushroom
Photo Credit: Students



Figure 4. Hen of the forest
Photo Credit: Preston Layne



Figure 5. Molly Maze Polypore
Photo Credit: Wikidata



Figure 6. Orange Milk Cap
Photo Credit: D'Smith

Metadata

Soil component	Pond	Nature Trail
Potassium	K2 Adequate	K2 Adequate
Nitrogen	N4 Surplus	N3 Sufficient
pH	6.0	5.5
Phosphorus	P3 Sufficient	

Discussion

- From our Taxonomically and Genetically identified species in both locations we have found the Nature trail has a higher biodiversity
- We expected this because we hypothesized that the freshwater would create less healthy soil for the mushrooms
- Through finding our metadata which was four different values in the soil we concluded that the soil in the Nature Trail is healthier than the soil by the Pond
- After the values of the soils were found all signs point to the presence of freshwater affecting the soil values negatively towards mushroom biodiversity

Conclusions

In conclusion, the nature trail has a bigger biodiversity than the biodiversity of the pond. The reason for this is most likely because of the pond but could also be the amount of trees on the nature making the soil more nutritious for the mushrooms when they die. Even though we could not complete every part of the metadata, we can still determine that the soil is better than the soil of the pond because of the water, but because of the components of the soil so our prediction was correct.

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