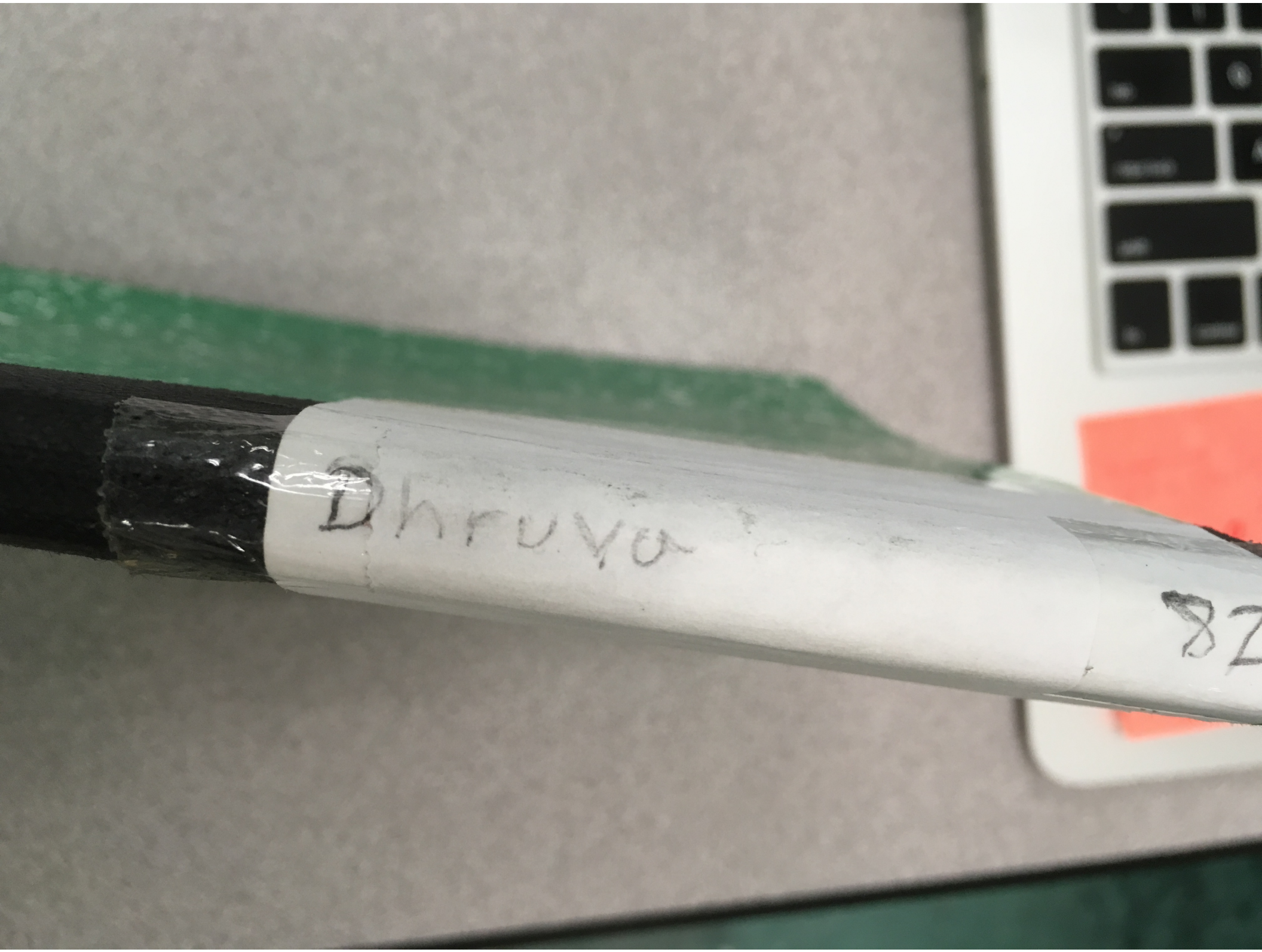
Dhruva

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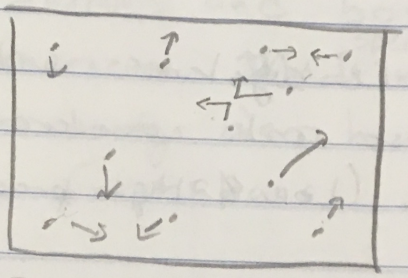
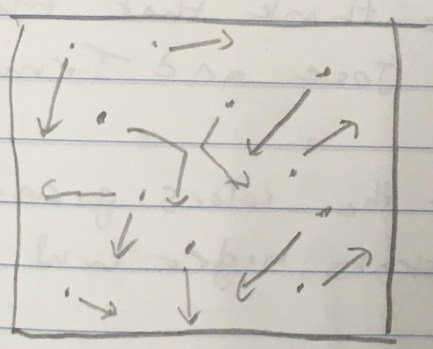
9/13/17 Notes on Temperature, Energy, and Heat

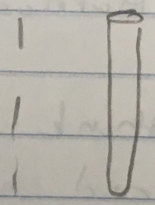
Cont. →



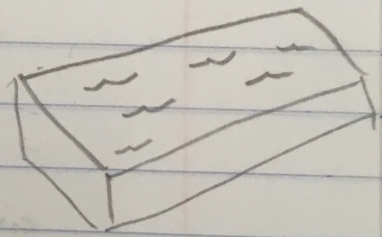
Room with Air
20°C



Higher Temperature
30°C



Tiny test tube of water, at 100°C



Giant Swimming Pool - 25°C

① Which has a higher temperature?

The test tube, of course (100 > 25)

② Which has more thermal energy?

The pool, because it has more volume

Tree Core Observations Sheet

Your Name:
Dhruv
Collection Date:
2/13/2017

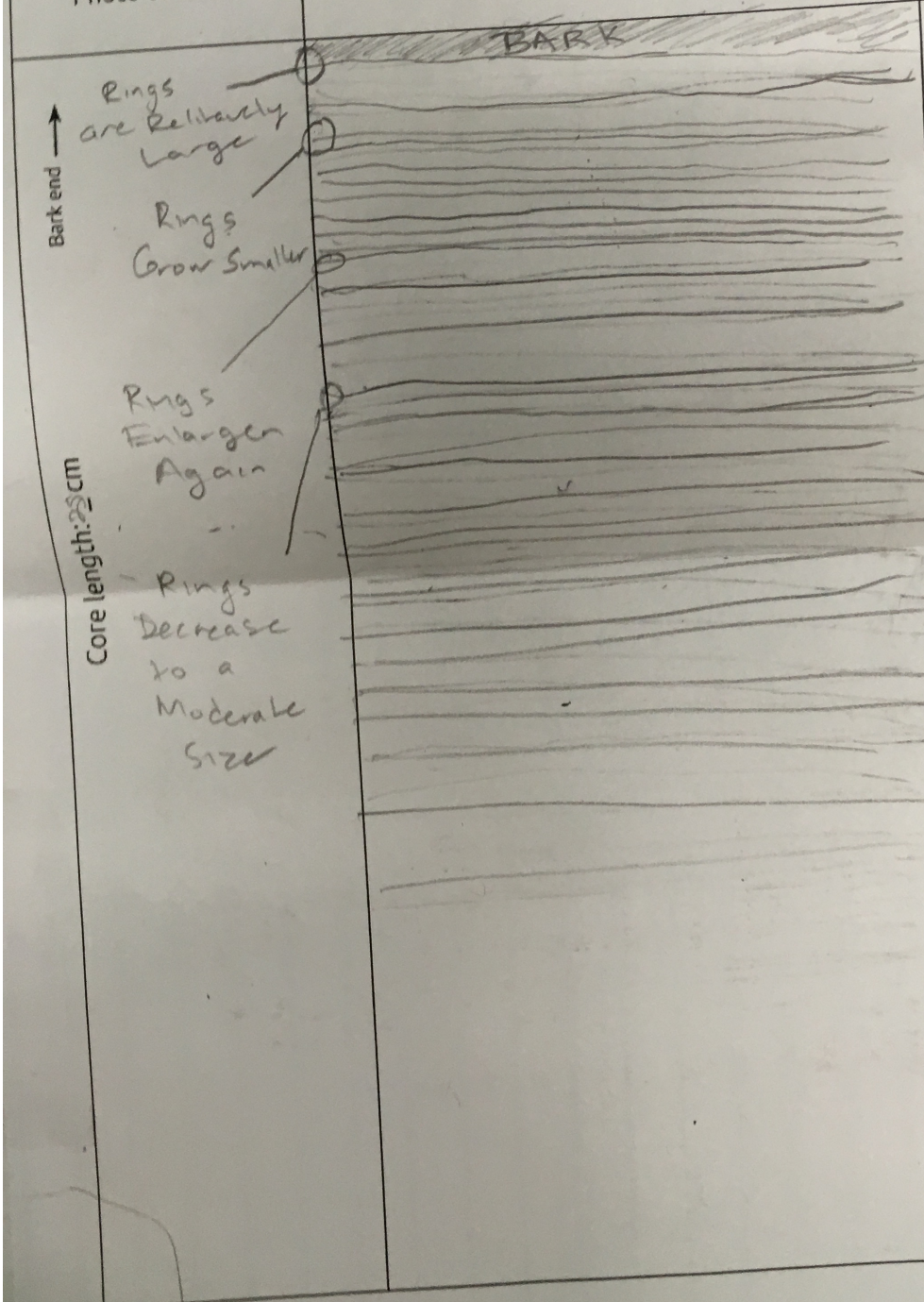
Location: Front of Heath School, MA, USA
Latitude and Longitude:
42° 19' 41" N, 71° 8' 52" W

Species of Tree:
Popcar Tree

Estimate of Tree Age:
49

Photo of Core:

Drawing of Core:



Notes and other observations about this tree:

- The bark end is a different shade of brown (slightly darker) than closer the center
- Some rings are fainter than others
- The shade of the wood changed slightly over time
- The more recent rings are closer together than some of the older rings
- The center is darker
- There are roughly 49 rings on the tree core

9

9

Inferences for Tree Diagram and "Adventures in Dendrochronology"

Inferences

- The large tree rings that formed in the past were a result of favorable conditions, likely plentiful rainfall, as the tree looks able to get sufficient sunlight and [disease] free
- The smaller rings may be a result of drought, as to me the tree looks healthy [without plague] and able to get enough sunlight to survive.

"Tree Anatomy and Tree Rings" Article Summary

The anatomy of a tree is indeed very intricate. Composing most of the center of the trunk is hardwood, or dead wood cells from previous years. The middle three layers, the sapwood, cambium, and phloem, are composed of living cells that complete jobs for the tree, all protected by the outer bark, the outermost layer.

In addition to having an intricate anatomy, trees also produce rings: a lighter type in the spring and early summer, and a thinner, darker type, in late summer and early fall. The thickness of these rings depends on growing conditions, as larger rings signify more growth and favorable conditions, while skinnier rings signify bad weather or disease (e.g. drought, insect infestation, fungus, colder summer/spring, etc.).

9/19/17

Original 9/20

9

My Poplar Tree's "Story"

Most recently, my tree has been going through relatively good times. For the past two years, it has had good weather and growing conditions, producing large rings. During the nine years before that, however, there is a somewhat drastic worsening in the tree's growing conditions, maybe because of drought or decreased rainfall. As a result, the tree produced very thin rings. Before even this wood was produced, however, three of the largest rings in the entire core appear. This signifies that growing conditions were optimal and rainfall was plentiful, allowing the tree to grow rapidly. Lastly, in the eleven years primer to this era, okay weather and growing conditions and likely average rainfall allowed the tree to grow relatively average sized rings.

Revised 9/21

My Poplar Tree's "Story"

Most recently, my tree has been going through relatively good times. For the past two years, it has had good weather and growing conditions, likely plentiful rainfall, producing large rings. During the nine years before that, however, there is a somewhat drastic worsening in the tree's growing conditions, maybe because of drought or decreased rainfall. I think that drought befell this tree because I can't seem to observe anything else that may have been wrong with it, as when I saw it, it looked healthy (pest free) and able to get enough sunlight. Before even this wood was produced, however, three of the largest rings in the entire core appear. This signifies that growing conditions were optimal and rainfall was plentiful, allowing the tree to grow rapidly. Lastly, in the eleven years primer to this era, okay weather and growing conditions and likely average rainfall allowed the tree to grow relatively average sized rings.

10

Hillside Pond Inveshgahon Photo Log

Time:	Locahon:	What/Why:
9:30 am	A — #2 IMG_1688	Hill between our site and pond. The are rain erosion patter on it
9:30 am	A — #1 IMG_1689	A picture of our plot
10:22 am	A — #3, #4 IMG_1694- IMG_1695	Left: White Oak on our plot. Right: One of the Yellow Birches
10:24 am	A #5 IMG 1698	Red Baneberry in our plot
10:51 am	A — #6, #7, #8 IMG= 1702-1704	Oak Pictures for Coring
11:10 am	A — #9, #10, #11 IMG-1706-1709	2nd Oak Tree Pictures for coring

Location Coordinates:

A: 42° 13' 10" N, 71° 5' 9" W
B: 42° 13' 11" N, 71° 5' 10" W
C:
D:

Geotaging: IMG_1692

Coordinates: IMG_1693

Katya's Photos

Time	Location	Purpose
9:35	B	Area around trees
9:46	B	Red Baneberry in plot
9:56	B	Tree in quadrant
9:56	B	The tree we cored
9:46	B	Plant in Quadrant

9/28/

Hillside Pond Notes

9:38

Temp: 76°, Generally clear and sunny, UV Index: 5.4, Humidity 62%

Slope of plot: 18°

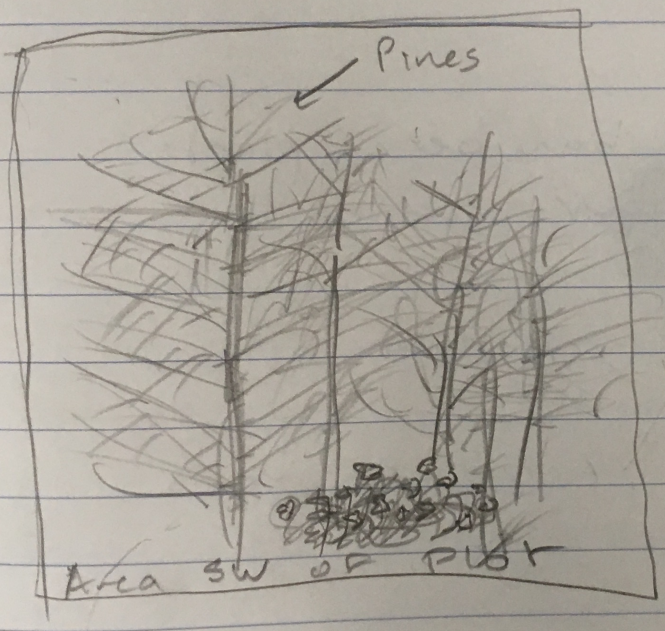
Observations:

- There is one small steep hill in between our plot and the pond. Therefore, I speculate that the rainwater from here has drained into the pond. Although there are erosion patters on the hill, none of them are related to the pond

- Plant Biodiversity Observations around our plot: There are many small evergreens around our plot, mostly pines. Large elms, oaks, and other deciduous trees shade the area. Southwest of the plot, there are some pines clustered together, sharing space with some small white

flowers, some of which are on the plot. Erosion patterns and moss line the hill, along with some trees.

Ground: Many small, leafy plants grow on the ground around our plot. Some wildflowers, as shown below, also dot the area, growing in small patches (see drawing). The ground is lined with leaves, sticks, and fallen and rotting trees. Some mushrooms were observed in the area.



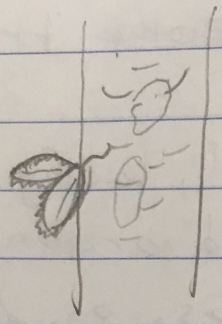
Quadrant Biodiversity Census,

Deciduous Trees: Two of the same type (Yellow Birch), one different (White Oak)

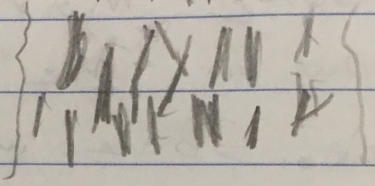
Evergreen Trees: 0

16

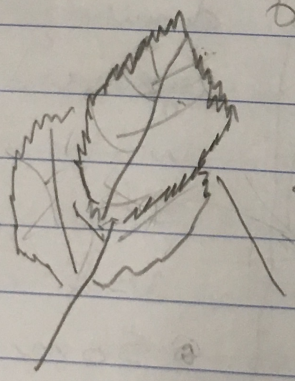
Birch, Lower Trunk

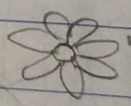


White Oak



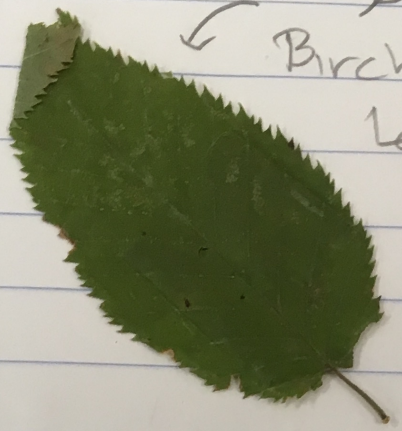
~10 red bane berry plants in our gradient





Serrated, veins

Yellow Birch Tree leaf (Count: Two in plot)

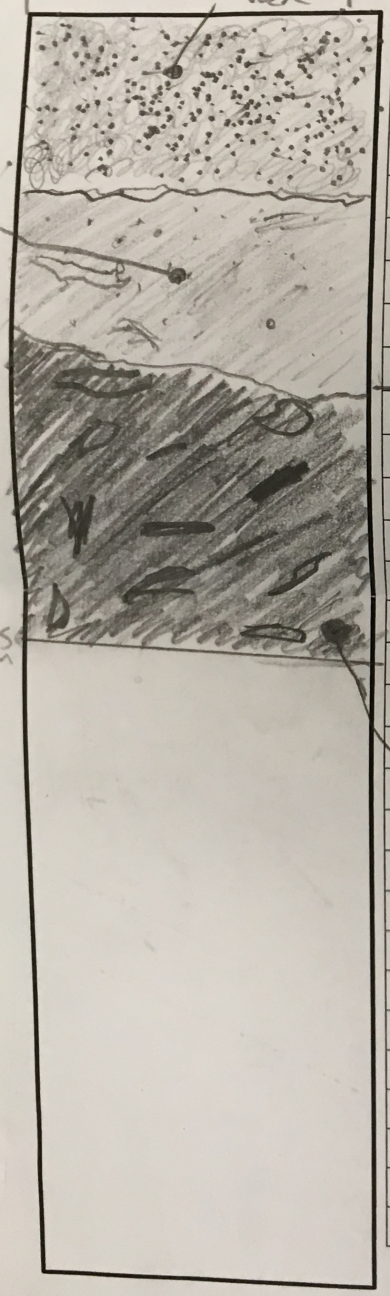


Red Baneberry Leaf (Count ~ 10-12 in plot)

Plant ID

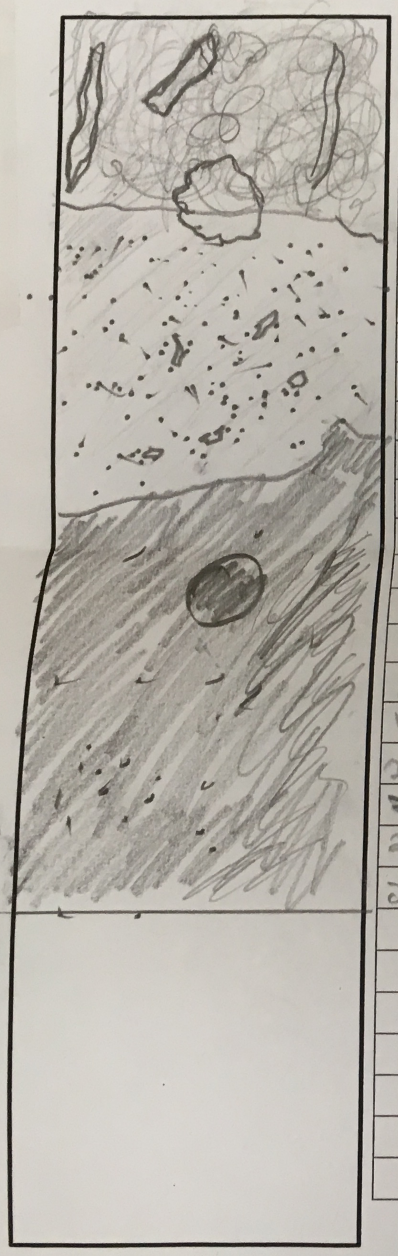
- Two Yellow Birches
- About Ten Red Baneberries
- One Large White Oak

Date: 9/28/17	Name: Dhruva	
Sample Location: Hillside Pond	Latitude: 40° 13' 8" N	Longitude: 71° 5' 11" W
Core Length: 15.5 cm	Time: 12:30 w/ Mr. G & Katya	



cm	Color	Texture	Observations
1–4	5YR 2.5/1 "Black"	Sandy and somewhat packed	Medium grained sand and sediment, almost no organic material or peat.
5–9	10YR 2/1 "Black"	Mix of peat and sand, slightly more packed than top layer	Medium to fine grained sand and peat, with some larger sticks and pieces of decomposing wood.
10–15	7.5YR 2.5/1	Peat with sparsely placed coarse grains of sand	Coarse grains of sand sparsely scattered around the section. Mainly peat, with more twigs and decomposing wood than the other layers
16			Took slide from here

Date: 9/28/17	Name: Dhruva		
Sample Location: Hillside Pond, Blue Hills Reserve		Latitude: 42° 13' 8" N	Longitude: 71° 8' 11" W
Core Length: 23 cm			



cm	Color	Texture	Observations
1–6	2.5 Y 3/2	Peat, Rough & Dry	Many decomposing sticks, acorns, and leaves are packed together in this layer composed of mainly peat
7–11	5Y 4/2	Dry sand with some peat	Mainly sand, with some peat and decomposing wood.
12–23	10YR 2/2	Rich, moist soil and peat with some decomposing wood and sand	Medium-fine grain soil/sediment/peat that is moist makes up this layer. In addition, there are small amounts of rotting wood, with one large stick

Tree Coring

Core 1

Tree Height: 50-60 ft
Type: White Oak
On Plot: Yes

Location A

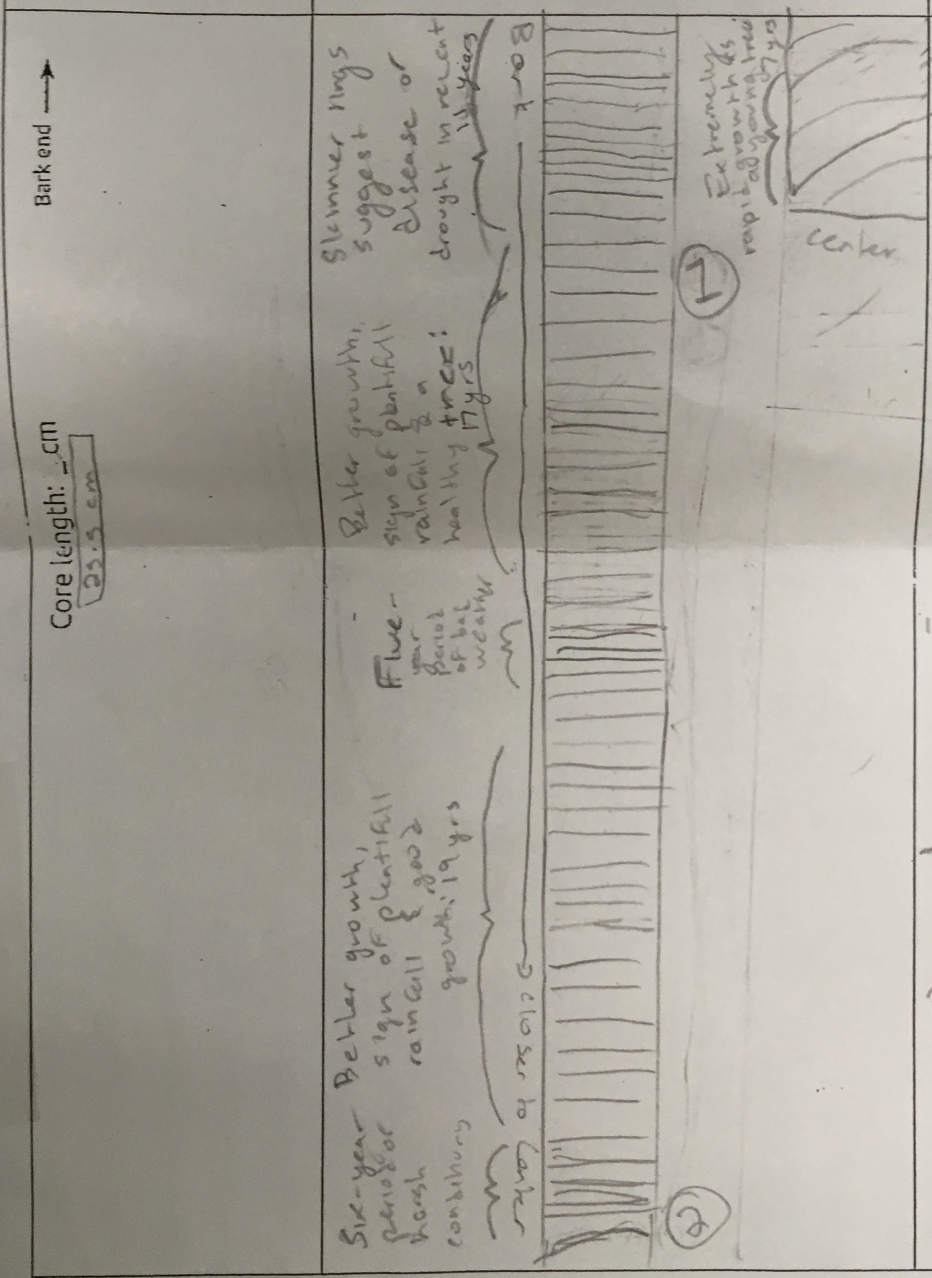
The core was difficult to get at first, as the outer bark was tough. However, later, a strange liquid from the tree came gushing out of the drill bit. We don't know what it was, but it smelled revolting

Core 2

Same species and height, not on plot, no liquid.

Tree Core Observations Sheet

Your Name: Dhruva Collection Date: 9/26	Location: Hillside Pond Latitude and Longitude: 42° 13' 10" N 71° 5' 9" W	Species of Tree: White Oak
Photo of Core:	Drawing of Core:	Estimate of Tree Age: ~ 65–70 years



Notes and other observations about this tree:

- Black splotches on wood, suggesting disease
- Some rings have holes in them, maybe indicating nothing?
- Darker brown towards bark, lighter but black/grayish in the center (switch from colors around 15-25 years ago)
- Periods where rings are closer and farther apart

Key:

1) Grayish color from here to center
2) Rings begin curving towards center

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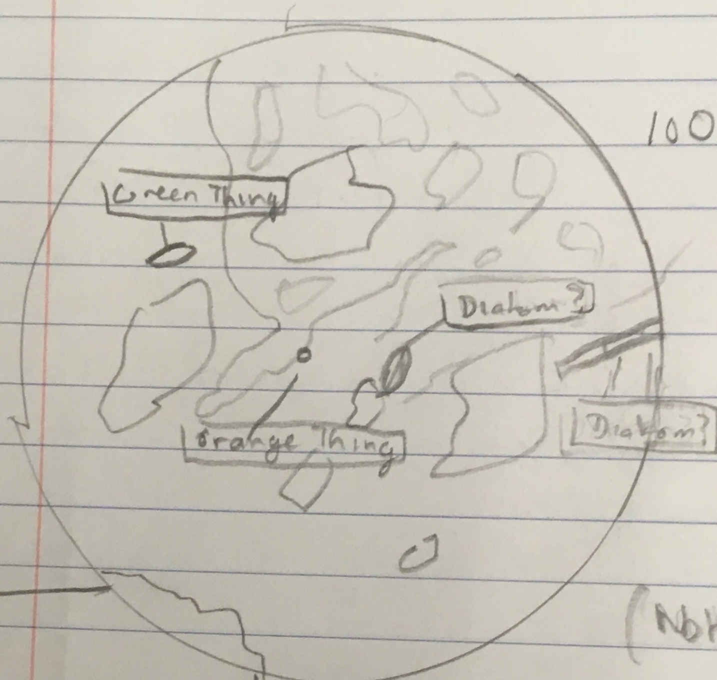
Diatoms from Hillside Pond

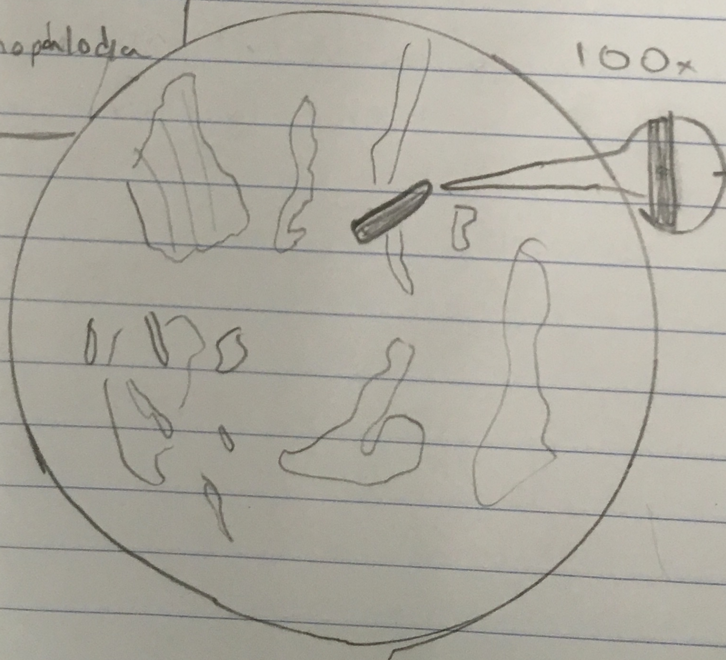


100x

Little to No Diatoms

(Not finished yet)

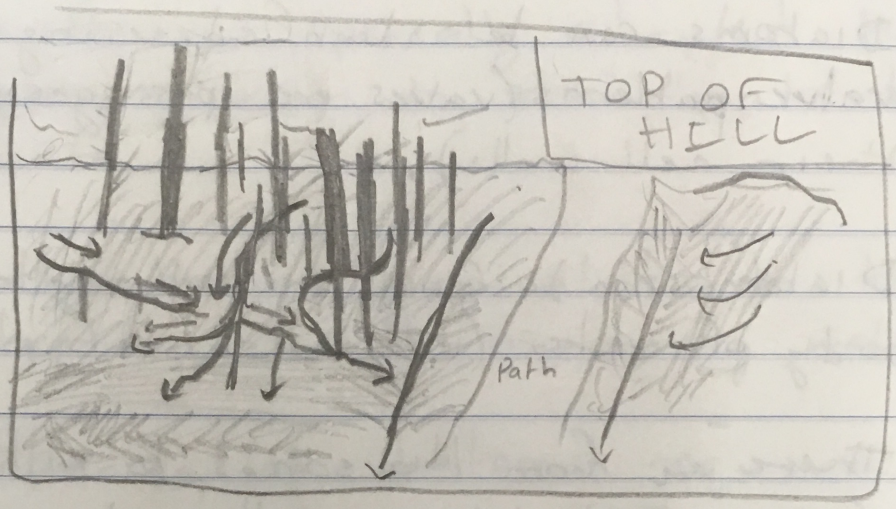
ID
From Middle (Not Drawn): Rhopalodia Gibba



100x

Diatom!
Possibly Sellaphora
Bacillum

Erosion Evidence



(Not finished yet)

- Erosion paths visible on the hill where arrows are drawn, indents in soil w/ no plants
- Fertile sediment at the base of the hill/in the small valley where the plot was.
-

Diatom Reading

24

Main Ideas

PI) Diatoms can be identified using their valve patterns (valves are passages through their cell walls).

PII) Diatoms can be found in virtually every body of water (or moist/wet places).

PIII) There are from thousands to millions of types of diatoms on this planet, all in the protist kingdom

PIV) Diatoms produce a significant percentage of the oxygen that we breathe (20-40

PV) The majority of diatoms cannot be viewed with the naked eye! They are microscopic. (2 - 500 microns)

PVI) Some diatoms reside in planktons, which grow in complicated arrangements to keep themselves afloat.

PVII)

PVIII)

PIX)

PX)

P VII) Other diatoms live on moist/wet surfaces, specially adapted to grow in order to stick onto this surface.

P VIII) Other diatoms grow stalks to help keep them still in moving water.

P IX) Species of diatoms require very specific and different conditions to survive.

P X) Diatoms build up in sediment at the bottom of bodies of water that paleoecologists can use to study climate trends (