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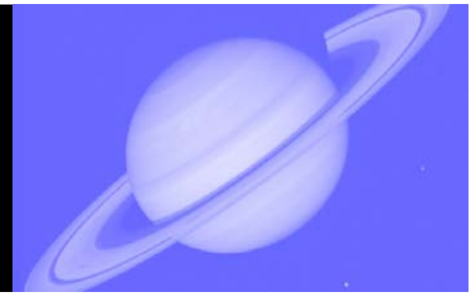

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Editorial

The purpose of the *Science and Technology Undergraduate Research Notes (SATURN) Journal* is to provide a venue for publication of undergraduate research. This research may include any novel findings of note while providing an opportunity for undergraduates to experience dissemination of their findings to the scientific community. Our goal is for the *SATURN Journal* to serve as both an educational and research tool. Each publication in this issue of the *SATURN Journal* has been reviewed by the professor for the course and by an outside scientist.

Worthwhile data from embedded research in laboratory course curricula can be disseminated to the world community. By contributing their own novel findings for the greater good, students can be engaged in science through embedded research pedagogy more than through conventional pedagogy, and a source of large scale cataloging information can be developed by many students contributing novel data.

The *SATURN J.* Tree Survey pedagogy is an ongoing, cost competitive method of including embedded research in a non-majors science course, and has been successfully implemented at SCCC since the Spring Semester of 2012. It easily fits into the curriculum of contemporary *Principles of Biology* non-major science courses. Also, it has evolved into an instructed, crowd sourcing method for research that can readily be adopted by other institutions. This pedagogy has the capacity to provide valuable and long term undergraduate research experience nationwide.

The *SATURN J.* began its' first issue with students from a Principles of Biology class at Suffolk County Community College (SCCC) in New York contributing their findings from a research project embedded in the laboratory curriculum. Specimens of each tree found on residential properties were brought to class. The species of each tree was identified by using a traditional dichotomous key.

Students collaborated in groups to develop hypotheses based on the locations of the properties where the trees were found, the distribution of species, circumferences of trunks and population densities. The students followed the instructions for authors at the web site for the *SATURN Journal* (www.saturnjournal.org), and submitted their manuscripts to their instructor who acted as a peer reviewer. Those students whose manuscripts were accepted upon revision received a grade of 'A' and were given extra credit for the revision and publication. This has been a cost effective exercise that has resulted in enthusiastic student engagement, and is building a catalogue of the distribution of tree species on residential properties in Suffolk County, New York. There was also a publication in this issue by a group of students who were enrolled in a statistics course. They compared the growth rates of different cultivars of the American Elm (*Ulmus Americana L.*) planted on campus at SCCC.

In the second issue of the *SATURN Journal* there was a continuation of student publications pertaining to the embedded research project analyzing tree species distribution. Students found it helpful to compare their findings to the findings of student investigators who have published previously in the *SATURN Journal*, which resulted in citations of previously published students.

The second issue also contained publications from a research project embedded in a microbiology course from which students reported their findings from tests of the antimicrobial properties of spices.

In the third issue of *SATURN J.* there was continuation of research projects that produced publications in the previous journals. New publications compared findings to a larger battery of previously identified trees. Students used the web site from the United Stated Geological Survey (www.usgs.gov)
to report the latitude and longitude of properties included in the studies. Additional web based tools used by students included online dichotomous keys such as vTree at Virginia Tech located in Blacksburg, Virginia (http://dendro.cnre.vt.edu/dendrology/idit.htm).

The fourth issue of *SATURN J.* included an article published by students at Molloy College regarding sweeteners and inflammation in macrophages, three additional articles from the microbiology course at SCCC, and a continuation of the *SATURN J.* tree survey. In addition, the abstracts from the

2014 Northeast Regional Sigma Xi Conference held at SUNY Old Westbury were presented.

In the fifth issue of the *SATURN Journal* we presented an additional article from the microbiology course at SCCC that compares soil bacterial communities on Long Island, and multiple articles that continue the *SATURN J.* Tree Survey.

In this sixth issue of the *SATURN Journal* we are happy to present additional articles from the microbiology course at SCCC that compares soil bacterial communities on Long Island. We also present multiple articles that compare soil composition, and multiple articles that continue the *SATURN J.* Tree Survey. Both are from a Principles of Biology course at SCCC. In addition, we present two articles from students at Molloy College that test the effects of teratogens on *Planeria*.

We encourage instructors to have their students participate in the *SATURN Journal*. The publications in the journal are a source of embedded research project designs that instructors may include in their curricula. The journal serves as a venue for dissemination of student research and a source for students to compare their work to the work of others. Instructors are welcome to design additional projects from which their students can submit manuscripts.

Louis Roccanova, Ph.D.
Editor in Chief
SATURN Journal

Clinton vs. Trump, 2016 Presidential Poll in Suffolk County, NY

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Keywords: Statistics, Hillary Clinton, Donald Trump, 2016 Election, Suffolk County

Abstract:

A survey of one hundred ninety two likely voters from Suffolk County, New York, occurred over the course of eight days (May 3, 2016 - May 10, 2016), stating their preference for Donald Trump, Hillary Clinton, or another party. A population proportion estimate was determined by the sample as a whole, divided by gender, and divided by age group. The results of the evaluation show a majority support for Trump in the upcoming 2016 Presidential Election.

Introduction:

The 2016 presidential election will take place in November 2016. The election has had many competitors, however the New York State primaries elected Trump as the winner for the Republicans and Clinton the winner for the delegates, making them the top choices in the state. In addition, Trump is the only Republican candidate still campaigning, and Clinton holds more delegate than her rival, Bernie Sanders, marking a good chance for the frontrunners of the race to be Trump and Clinton.

The objective of this study is to determine the population proportionate of support for each candidate in order to determine whom Suffolk County will most likely vote for in the upcoming election.

Methods:

One hundred ninety two people were polled, each one describing themselves as a likely voter for Trump, Clinton, or another party. Likely voters were those of which who were determined to vote for the candidate they chose. Any voter less than likely to vote was removed from the study. The data was recorded from May 3 - May 10, 2016 in Suffolk County, New York via phone calls. Population proportion estimates were based on an overall view, on gender, and on age groupings (18-29, 30-39, 40-49, 50+). The 30-39 and 40-49 age groups were combined into a single group in order to ensure a large enough sample was used. Listed below in the tables is the collected data broken down:

	Trump	**Clinton**	**Other**	**Total**
Male	66	35	2	**103**
Female	51	38	0	**89**
Total	**117**	**73**	**2**	**192**

	Trump	Clinton	Other	Total
18-29	35	26	1	**62**
30-49	32	24	0	**56**
50+	50	23	1	**74**
Total	**117**	**73**	**2**	**192**

Results:

The tests were all performed with a 95% confidence using Z-tests. Overall analyses of Trump versus Clinton showed the population proportion point estimate of support for Trump to be 60.94% with a margin of error of 6.90%, while Clinton's point estimate was 38.02% with a margin of error of 6.87%.

Overall analyses of male likely voters showed a population proportion point estimate of 64.08% showed support for Trump, with a 9.27% margin of error, while a point estimate of 33.98% was observed for Clinton with a 9.15% margin of error. Overall analyses of female likely showed a population proportion point estimate of 57.30% supporting Trump and 42.70 supporting Clinton, both with a margin of error of 1028%.

The analysis of voters ages 18-29 presented a population proportion point estimate of 56.55% supporting Trump with a 12.34% margin of error, whereas 41.94% support Clinton with a margin of error of 12.28%. Voters 30-49 showed a 55.36% point estimate of support for Trump and a point estimate of 44.64% in favor of Clinton, both with a margin of error of 13.02%. Voters 50+ resulted in a point estimate of 67.57% in favor of Trump with a margin of error of 10.67% and a point estimate of 31.08% supporting Clinton with a 10.95% margin of error.

Discussion:

To the best of my knowledge, at no time has there been any data collected In Suffolk County, New York to compare my finds with. On a national level, however, Real Clear Politics has the results of several New York based Trump versus Clinton matchups, and the results clearly favor Clinton, with the lowest difference in support being 16% with a 2.5% margin of error, which conflicts the data collected in Suffolk County. However, according to the United States Census Bureau, the population of Suffolk County as of July 1, 2015 was estimated to be 1,501,587, just 7.58% of the estimated 19,795,791 residents of the State of New York. Suffolk is one of the wealthier counties in the state, so there could potentially be a correlation between wealth and political affiliations, however more research would need to be conducted to conclude such a thing.

Conclusion:

Based on the data from this study, there is a much stronger support for Trump in Suffolk County, New York, overall, and also by both genders and age groups. While the margin of error allows for some overlap in certain studies, Trump appears to be the clear winner, with at least 54.04% of the vote, while the maximum support Clinton will receive overall is only 44.89%.

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Testing of Nitrogen, Phosphorus, Potassium, pH Levels and Moisture Content in Soil on Four Residential Properties in Islip, East Islip, Northport and East Northport on Long Island

Authors: Julia Baldassarre, Jennifer Landaverde, Christina Melillo, Audrey Pfeifer

Keywords: Nitrogen, Phosphorus, Potassium, Soil

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Abstract:
Forty six soil samples were collected from four residential properties including, twelve from Islip, ten from East Islip, twelve from Northport and twelve from East Northport. Twenty two samples were from the South Shore of Long Island and twenty four samples were from the North Shore of Long Island. Each sample was taken from the ground two inches under the surface and all equidistant apart from each other on the properties. Each sample was tested for the concentration of nitrogen, phosphorus, and potassium using a soil testing kit. The pH of the soil and the moisture were also tested. It was found that soil from the South Shore Long Island properties in this study are more nutrient rich than the soil from the North Shore properties.

Introduction:
The experiment was done on Long Island, which is part of the Northeastern region of the United States. The soil on Long Island was greatly affected by a massive continental glacier and as it receded it left the North shore soils rocky and the glacier created the sandy South Shore (Nassau County Soil & Water Conservation District 2016). Soil is the top layer of the earth composed of organic and inorganic material created over time in reaction to temperature and moisture working on parent material. Soils vary with slope and sun orientation and where there are higher concentrations of clay, water is retained. Soils are created and influenced by parent material, climate, topography, biological factors, and time (Nassau County Soil & Water Conservation District 2016). Nitrogen is the nutrient most often deficient for crop production. When nitrogen inputs to the soil system exceed crop needs, there is a possibility that excessive amounts of nitrate may enter either ground or surface water (Lamb et al. 2014). Phosphorus is an essential element because large amounts are required by plants. Phosphorus is one of the three nutrients generally added to soils in fertilizers. One of the main roles of phosphorus in living organisms is the transfer of energy. Adequate phosphorus availability for plants stimulates early plant growth and speeds up maturity. Mismanagement of phosphorus in soil can pose a threat to water quality. Too much phosphorus in fresh water accelerates algae growth, high levels of algae reduce water clarity and can lead to decreases in available dissolved oxygen as the algae decays, conditions that can be very detrimental to fish populations (Busman et al. 2009). Potassium is also essential for plant growth. Potassium is associated with movement of water, nutrients, and carbohydrates in plant tissue. If Potassium is deficient or not supplied in adequate amounts, growth is stunted and yields are reduced (Rehm and Schmitt 2002).

Methods:
For this experiment four students took twelve soil samples from a residential property. All the samples were collected from two inches below the surface and equidistant apart from each other throughout the property. The LaMotte soil testing kit (directions included in packaging) was used to test for the concentration of nitrogen, phosphorus, and potassium. All twelve samples were tested for the pH using a pH tracer and the moisture content using a moisture meter. Both tools are used similarly by placing the probe into the soil and reading the display monitor.

Results:
According to the data that was collected, it was found that the average pH on the South Shore was 6.8 and the average pH on the North Shore was 6.7. The average moisture content on the South Shore was 1.5mm and the average moisture on the North Shore was 1.25mm. The most occurring nitrogen concentration on the South Shore was low (40 lb/ A/6”). The most occurring nitrogen concentration on the North Shore was also low (40 lb/ A/6”). The most occurring phosphorus concentration on the South Shore was medium (20 lb/ A/6”) and the most occurring phosphorus concentration on the North Shore was low (8 lb/ A/6”). On the South Shore the most occurring concentration of potassium was high (160 lb/ A/6”) and on the North Shore the most occurring concentration of potassium was medium (80 lb/ A/6”). According to the data the soil on the South Shore has the same concentration of nitrogen as the North Shore. The South Shore has higher concentration of phosphorus and a higher concentration of potassium than the North Shore. The South Shore has a higher pH level than the North Shore and a higher moisture concentration than the North Shore. We found that the pH and the moisture concentration is marginally greater on the South Shore than the North Shore. The data also shows that the South Shore has a greater concentration of phosphorus and potassium than the North Shore but there is similar concentration of nitrogen on both the North and South Shore.
Table 1 shows the four locations that were used in order to conduct this experiment.

Table 1: Residential Locations Used for Sample Collection

Islip, New York	East Islip, New York	Northport, New York	East Northport, New York
Latitude: 40.7336369 Longitude: 73.2017559	Latitude: 40.743194 Longitude: 73.173424	Latitude: 40.8913050 Longitude: 73.3403840	Latitude: 40.8934120 Longitude: 73.3188360
Elevation: 7.9248 m	Elevation: 9.7536 m	Elevation: 56.6928 m	Elevation: 50.9016m
Size: 51.816 x 38.1 m	Size: 30.48 x 22.86 m	Size: 33.528 x 66.4464 m	Size: 30.48 x 38.1 m

Table 2: Nitrogen, Phosphorus, Potassium, pH, and Moisture Content in Soil on a Residential Property on the South Shore

South Shore Islip, New York	Samples	Nitrogen	Phosphorus	Potassium	pH	Moisture Content
	1	low	low	high	6.7	2
	2	low	medium	high	7	1
	3	low	medium	high	6.8	1
	4	low	high	high	6.8	2
	5	low	medium	medium	6.9	1.5
	6	medium	high	medium	7	1
	7	medium	high	high	7	1
	8	low	medium	high	6.7	3
	9	medium	low	high	6.7	2
	10	low	medium	high	6.5	2
	11	low	low	medium	6.6	1
	12	medium	low	high	6.8	1

Table 3: Nitrogen, Phosphorus, Potassium, pH, and Moisture Content in Soil on a Residential Property on the South Shore

South Shore East Islip, New York	Samples	Nitrogen	Phosphorus	Potassium	pH	Moisture Content
	1	low	medium	medium	6.8	2
	2	low	medium	medium	6.8	1.5
	3	medium	high	low	7	2
	4	medium	high	high	7	1
	5	low	medium	medium	6.8	3
	6	medium	high	medium	6.9	1
	7	medium	low	low	6.8	1
	8	medium	low	medium	6.5	2
	9	low	medium	low	6.9	0
	10	high	medium	medium	6.6	1

Table 4: Nitrogen, Phosphorus, Potassium, pH, and Moisture Content in Soil on a Residential Property on the North Shore

North Shore Northport, New York	Samples	Nitrogen	Phosphorus	Potassium	pH	Moisture Content
	1	low	medium	high	7	1
	2	low	low	high	6.5	1
	3	low	low	medium	6.5	1
	4	low	low	medium	6.8	1
	5	low	low	medium	6.5	1
	6	low	low	medium	6.9	1
	7	low	low	high	7	2
	8	low	medium	medium	6.8	2
	9	low	low	medium	6.7	1
	10	low	low	medium	6.5	0
	11	low	medium	medium	6.5	1
	12	low	low	high	6.8	0

Table 5: Table 4: Nitrogen, Phosphorus, Potassium, pH, and Moisture Content in Soil on a Residential Property on the North Shore

North Shore, East Northport, New York	Samples	Nitrogen	Phosphorus	Potassium	pH	Moisture Content
	1	low	low	medium	6.5	1
	2	low	low	medium	6.5	2
	3	low	medium	medium	6.7	2
	4	medium	medium	medium	6.8	3
	5	low	low	high	6.8	2
	6	low	low	high	7	1.5

	7	low	medium	medium	7	1.5
	8	low	low	high	6.8	1
	9	low	low	medium	6.9	1
	10	medium	medium	medium	6.6	1
	11	medium	low	medium	6.5	2
	12	low	low	medium	6.5	2

Discussion:
Since the South Shore may have higher concentrations of phosphorus and potassium it may be concluded that the plants on the South Shore may be healthier than the plants on the North Shore because both potassium and phosphorus are essential to the plants growth and overall health (Busman et al. 2009). Plants require large amounts of phosphorus, however too much phosphorus could pose a threat to our water quality (Busman et al. 2009). The South Shore also has a higher moisture concentration which is essential for potassium because the moisture increases the movement of potassium to the plants roots (Rehm & Schmitt 2002).

Conclusion:
After testing each sample of soil from the residential properties of Islip, East Islip, Northport and East Northport the overall findings of this report are that the South Shore properties in this study have more nutrient rich soil than the North Shore. The South Shore properties have greater levels of phosphorus and potassium which are essential for plant growth. The nitrogen levels are equal on both the South and North Shore properties. The South Shore properties also have higher moisture concentrations which is more conducive to healthy plant growth. The South Shore also shows a more constant pH than the North Shore.

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White Pine and Red Cedar Trees are Dominant Species on Residential Properties in Northport, New York

Authors : Daniel Boccard, Crysta Clarelli, Karley Oliva, and Lily Russo

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Keywords: Northport, East Northport, Trees, White Pine, and Red Cedar

Abstract:

A total of fifty tree branches were collected from two properties in East Northport, New York as well as one property in Northport, New York. After collecting the samples, two dichotomous keys were used to identify the species of each tree by characterizing the leaves and branches based off of color, shape, and texture. It was found that the most dominant tree species on the properties was the Atlantic White Cedar (*Chamalcyparis thyoides*) as well as Red Cedar (*Juniperus virginiana*).

Introduction:

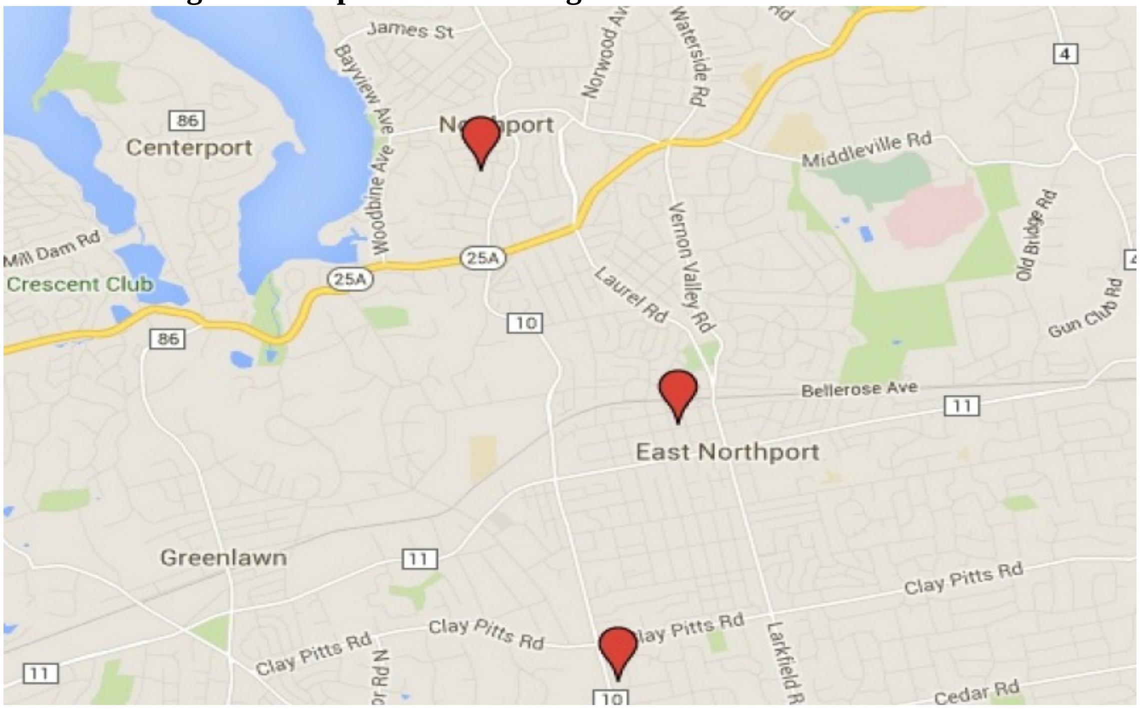
Some of the characteristics of an area that affect the species are height above sea level, climate, average rain fall, and location. Dichotomous keys are used to identify many tree species. Based on a number of characteristics that include color, shape, texture, and so on, scientists are able to identify a tree species and make inferences on why certain trees flourish in one location, while others simply cannot compete. According to the National Oceanic and Atmospheric Administration East Northport, New York can be found on the North Shore of Long Island at approximately seventy meters above sea level. The location of this town is 40° 52' 36'' N and 73°19'28'' W. The annual average rainfall is 43.79 inches. Temperatures can vary to the warmest of eighty two degrees Fahrenheit to the coldest of twenty four degrees Fahrenheit (NOAA 2014).

Methods:

Samples were taken from three different locations in Northport and East Northport residential areas in Suffolk County of Long Island, New York. Each location had a variety of different trees located on their property. We had a total of 50 trees for the study. The dominant species found in the Northport and East Northport areas was the White Pine (*Pinus Strobus).*

The species were identified through a dichotomous key by location and then differences and similarities were compared. The samples were identified using, *Tree Finder: A Manual for Identifying Trees by Their Leaves. (*Watts 1991) and *Peterson Field Guide to Eastern Trees and Shrubs* (Petrides 1988).

Figure 1: Map of Central Long Island with studied locations



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Results:

As seen in Table 1, the studied trees were in the Northport and East Northport locations.The following species were found in Northport; three White Pines *(Pinus strobus)*, one American sycamore *(Plantus occidentalis)*, and three Spruce *(Picea)* trees. The rest of the data collected were located in East Northport; twelve Red Cedars *(Juniperus virginiana)*, six Atlantic White Cedars *(Chamalcypans thyoides)*, six White Pines *(Pinus strobus)*, one Atlantic White Pine *(Cedrus atlantica)*, two Arbor Vitaes *(Thuja occidentalis)*, one Black Willow *(Salix nigra)*, one Peach Leaved Willow (Salix amyddaloides), one Live Oak *(Quercus virginiana)*, and one Norway Spruce *(Picea Abies)*. A Majority of the species was non-native; only two species were native, both the Peach Leaved Willow (*Salix amyddaloides)* and Norway Spruce (*Picea abies).* There were a total of twelve species found in both residential areas, two were dominant. There were nine White Pines *(Pinus strobus)* and twelve Red Cedar (*Juniperus virginiana)*.

Table 1- Sample of Trees found in Northport

# Found	Common Name	Scientific Name
3	*****White Pine	*Pinus strobus*
3	Spruce	*Picea*
1	American Sycamore	*Plantus occidentalis*

Table 2- Sample of Trees found in East Northport

# Found	Common Name	Scientific Name
12	Red Cedar	*Juniperus virginiana*
6	Atlantic White Cedar	*Chamalcypans thyoides*
6	***White Pine**	*Pinus strobus*
4	Atlantic White Pine	*Cedrus atlantica*
2	Arbor Vitae	*Thuja occidentalis*
1	Black Willow	*Salix nigra*
1	Peach Leaved Willow	*Salix amyddaloides*
1	Live Oak	*Quercus virginiana*
1	Norway Spruce	*Picea abies*

* **Indicates** trees that were at both Northport and East Northport residential areas

Discussion:

Comparing these studies with other studies that were conducted in the Northport/ East Northport area, Lee et al. (2013), identified the American Sycamore *(Plantus occidentalis)*, White Pine *(Pinus strobus)*, Red Oak *(Quercus rubra)*, White Spruce *(Picea glacua)*, Box Elder *(Acer negudo)*, and Black Ash *(Faxinus nigra)*. Their study showed similarity to this study in the sense that American Sycamore *(Plantus occidentalis)* (found in Northport), White Pine *(Pinus strobus)* (both Northport and East Northport), and Spruce *(Picea)* (found in Northport), are located on different residences across the Northport/ East Northport. Similarly, in another study conducted by Marino et al. (2012) in the Northport/ East Northport area shows an Arbor Vitae *(Thuja occidentalis)* tree present in the North shore area, in which Northport/ East Northport lies.

Conclusion:

Among the fifty different tree specimens that are occupying three different residential properties of the Northport/ East Northport area we conclude that the dominant species are White Pine (*Pinus strobus*) and Red Cedar (*Juniperus virginiana).*

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Red Maples are a Dominant Species on the North Shore and South Shore of Long Island while Spruces and Vitaes are Dominant on the North Shore and Oaks on the South Shore

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Keywords: Maple, Oak, Vitae, Bay Shore, Commack

Abstract:
Forty samples of trees were taken from residential properties on Long island. Samples came from Commack on the North Shore and from Bay Shore on the South Shore. There were twenty samples taken from each shore. The trees were classified using an application called “Leaf Snap” (Columbia University, University of Maryland, and Smithsonian Institution 2011) and a dichotomous key “Tree Finder Booklet” (Watts 1998). On the North Shore property there are Spruces and Vitaes but no Oaks and on the South Shore property there are Oaks but no Spruces or Vitaes. There were Red Maples on both properties.

Introduction:

It is common knowledge to Long Island residents that the North Shore is hilly and has rich soil, in some parts extremely rocky, while the South Shore has a lot of sand in the soil because it is closer to the Atlantic Ocean. Due to sand being in the soil, the soil is not as good for planting. According to the National Climate Zones (NOAA 2015), Commack is in zone 6b. The coldest recorded temperature in January is -5 degrees Celsius and has a max of 18.3 Celsius and min 28.3 Celsius in July. Bay Shore is in zone 7a. The climate in January is min -5 Celsius and max 30.3 Celsius. In July the climate is at a high of 18.3 Celsius and min of 28.3 Celsius (NOAA 2015). According to the hardness scale Commack has much harder soil than Bay Shore’s soil (NOAA 2015).

Methods:

A sample of every tree on two residential properties was collected to do a tree survey. One property was in Commack on the North Shore. The other property was on the South Shore in Bay Shore. There were twenty trees on each property. Twenty of those trees were from the North Shore and twenty were collected from the South Shore. After collecting our samples we identified our trees using an application called “Leaf Snap”. This allows scientists to take a picture using their device (iPhone, iPad, android, etc.) and match the picture to the correct species of tree. The dichotomous key is a tool that gives choices of alternative characteristics that leads to the identification of a species. Researchers at Colombia University, University of Maryland and Smithsonian Institution designed leaf Snap (Columbia University, University of Maryland, Smithsonian Institution 2011). This application helps to identify each tree sample. After identifying each tree sample the samples were placed into groups, trees on the North Shore and trees on the South Shore. The samples were then compared and tallied as to how many of the same species of trees were in each of the two groups. The results were later compared. The latitude and longitude of the properties were found on Google maps (Google 2015).

Results:

The latitude and longitude of the trees in Commack were located at Essex Place. The coordinates are 40.835521,-73.291411. The latitude and longitude of the tress in Bay Shore were located at Brookdale Ave, the coordinates are 40.7417520, -733052680 (Google 2015). Table 1 & 2 show the trees found on the North Shore and South Shore. On the North Shore property in Commack; there are 3 Colorado Spruces (*Picea pungens)* and 2 Norway Spruces (*Picea abies)* which is a total of 5 Spruces. It also has 5 Red Maples (*Acer rubrum)* , 2 Fringe-trees (*Chionanthus virgicus*) , 1 American Hornbeam (*Carpinus coroliniana)*, 1 Sargent Cherry *(Prunus sargentii),* 5 Arbor Vitaes *(Thuja accidentalis)* and 1 Japanese Maple *(Acer pulmatum)* . On the South Shore property in Bay Shore; there are 9 Oaks. The Oaks consist of 3 English Oak (*Querus robur*), 1 White Oak (*Querus Alba)*, 3 Spanish Oaks *(Quercus falcata)* and 2 Scarlet Oaks (*Querus coccinea)*. The rest of the trees were 10 Red Maples (*Acer rubrum)* and 1 Japanese Tree Lilac (*Syringa reticulata)*. It was found that both the North and South Shore had Red Maple Trees.

Table 1- North Shore (Commack) Latitude: 40.835521 Latitude: -73.291411

# Of Trees	Tree Names	Scientific Names
3	Colorado Spruce	*Picea pungens*
2	Norway Spruce	*Picea abies*
5	Red Maple	*Acer rubrum*
2	Fringe-Tree	*Chionanthus virgicus*
1	Americain Hornbeam	*Carpinus coroliniana*
1	Sargent Cherry Tree	*Prunus sargentii*
5	Arbor Vitae	*Thuja accidentalis*
1	Japanese Maple	*Acer pulmatum*

Table 2- South Shore (Bay Shore) Latitude: 40.7417520 Longitude: -73.3052680

# Of Trees	Tree Names	Scientific Names
3	English Oak	*Querus robur*
1	White Oak	*Querus alba*
3	Spanish Oak	*Quercus falcata*
2	Scarlet Oak	*Querus coccinea*
10	Red Maple	*Acer rubrum*
1	Japanese Tree Lilac	*Syringa reticulata*

Discussion:
The Red Maples were found in both the North and South Shore. However Spruces were found only on the North Shore while Oaks were only found on the South Shore with a couple of different species of trees. Oak trees have been known to grow in dryer murky areas (Baughman 2013). On the North Shore of Long Island, Messina et al. (2015) also found Spruces, Vitaes and Maple trees as was found in our study. Fringe Trees, Americain Hornbeam, Sargent Cherry and Japanese Maple trees were also found on the North Shore of Long Island in our study. Messina et al. (2015) did not find these species but they did find Hackberry and White Oak trees. Our study found Red Maples, Oaks and a Japanese Maple on the South Shore just as Longo et al. (2015) did. Instead of Oaks, Longo et al. found Spruces, Chestnuts, Dogwoods, Holly's, White Cedars, Blossoms, Pines, Mimosa Silk, Mulberry, Tree of Heaven and Fire Pin Cherry on the South Shore.

Conclusion:
Fifteen out of forty trees (37.5%) found in this study were Red Maples (*Acer rubrum*). Whether on the North Shore or South Shore it is easy to come across a Red Maple. The only species in this study found on both the North Shore and South Shore is the Red Maple. Seven of the species are non-native (Plant

Native 2015). This is 58% of the total species identified in this study. They are the Colorado Spruces, Sargent Cherry, Japanese Maple, Norway Spruce, English Oak, Spanish Oak and the Japanese Tree Lilac. The remaining five of the species are native which include the Red Maple, Fringe Tree, Americain Hornbeam, Arbor Vitae, White Oak and the Scarlet Oak (Plant Native 2015).

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Maple Tree Dominance in Huntington Station

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Keywords: Maple, Huntington

Abstract:
In this experiment we used a dichotomous key to classify 53 trees across two different residential properties located in Huntington Station, New York. The Types of trees varied on the two different properties. Thirty trees were classified on the first property. The second property had a total of 23 trees. Of the 53 trees 22 of them were classified as Maple trees.

Introduction:
Most of the trees found on the properties were Maple trees. The first type of Maple tree was the Sugar Maple. This tree is grown in a wide variety of soils, and prospers in the acidic soils that are found on Long Island (Morgan 2005). The next type of Maple tree is the Norway Maple. This type of Maple is tolerant of the urban society that is found on Long Island and in Huntington Station (Morgan 2005). Another type of Maple is the Red Maple, which along with the Sugar Maple, grows well in the acidic soil found on Long Island (Morgan 2005). Silver Maple grows well in a wide range of soil and are common in Huntington (Morgan 2005). These Maples are the most common ones that were found. We also found Japanese Maples and a variety of different trees ranging from a Birchwood tree to an Indian Bean Tree.

Method:
This experiment was done by two students who gathered samples of every tree that was on the land where they resided. Once the samples where gathered we used a variety of ways to identify what type of trees they were. The most common way we used was by an iPhone app called Leaf Snap (Jacky et al. 2011). This app takes a picture of the leaf and enters it into a database which then brings up possible matches of the tree so it can be identified.

Results:
Below are charts which show what types of trees are located on each property as well as a chart dedicated to the Maple trees. Table 1 compares the total number of trees to the total number of Maple trees on the two different properties. After we found the differences, we then calculated the percentage of Maple trees on each property. Table 2 classifies each tree that was found with their common name and their scientific name as well as how many times that they appeared on each property.

Table 1: Maple trees on the property.

Address	Number of Maple trees	Number of other trees	% Of Maple Trees
274 Crombie Street	15	15	50%
96 West 10th Street	7	16	30.43%

Table 2: Types of trees on each property.

Name of Tree	Scientific Name	96 West 10th Street	274 Crombie Street
Sugar Maple	*Acer saccharum*	3	8
Silver Maple	*Acer saccharinum*	2	6
Red Maple	*Acer rubrum*	1	0
Norway Maple	*Acer platanoides*	1	1
Japanese Maple	*Acer palmatum*	0	2
Edible Fig Tree	*Ficus carica*	2	0
Bosc Pear Tree	*Pyrus communis*	3	0
Lilac Tree	*Syringa vulgaris*	2	0
Staghorn Sumac	*Rhus hirta*	2	0
Birchwood Tree	*Betula lenta*	0	1
Holly Tree	*IIex opaca*	2	3
White Oak Tree	*Quercus alba*	1	4
Short Leaf Pine	*Pinus echinata*	3	0
Virginia Pine	*Pinus virginiana*	1	3
Balsam Fir	*Abies balsamea*	0	1
Scotch Pine	*Pinus sylvestris*	0	1

Discussion:
Out of all the trees that were studied the most common trees found were Maple (*Acer*) trees. This leads us to believe that these are the dominant trees of Huntington Station. Perez & Fuentes (2015) found that Maple trees were dominant in the 41 samples of trees that they collected on Long Island. Out of their 41 trees, 19 of them where classified as Maple trees. Perez and Fuentes found a variety of trees on the North Shore that we did not find. They found the Flowering Dogwood to be located on both the North Shore and South Shore. This study found similar species of Maples to those that were found by Perez and Fuentes.

Conclusion:
In this study we found that in Huntington Station there is a vast variety of trees. We found that the number of Maple trees were similar to the number of trees that were not Maples. One property had 50% Maple and the other one had 30.43%. On the two properties some of the Maples tree species identified were the same.

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Tree Species Differ From the North Shore to the South Shore of Long Island

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Keywords: North, South, Shore, Long Island

Abstract:
We tested whether the tree species on the North Shore of Long Island were different from the South Shore of Long Island. One property that was surveyed is located on the North Shore of Long Island in Port Jefferson Station. Here we collected 20 tree samples on the property. The other property which we observed is located on the South Shore, in Central Islip. Here we collected the other 20 tree samples. Our hypothesis was that the trees on the North Shore would differ from those found on the South Shore. Through the use of dichotomous keys, we identified the species of each of the trees from which we took a sample, and we classified them. The species collected in the North Shore were the White Spruce (*Picea glauca*), Eastern Hemlock (*Tsuga Canadensis*), Flowering Dogwood (*Cornus florida*), Umbrella Magnolia (*Magnolia tripleta*), Atlantic White Cedar (*Chemaecyparis thyoides*), and the Sugar Maple (*Acer saccharum*). The species collected on the South Shore were the Sycamore Maple (*Acer pseudoplatanus*), Black Ash (*Fraxinus nigra*), Arbor Vitae (*Thuga accidentalis*), Norway Maple (*Acer platanoides*), and the Colorado Spruce (*Picea pungens*). We found that although there were similar species of trees on the North and the South Shores, not one species was found in both areas simultaneously, which supported our hypothesis.

Introduction:
Long Island is an area with North and South Shores that are very unique in relation to one another. The North Shore has rocky beaches that run along the Long Island Sound, and the South Shore has sandy beaches that run along the Atlantic Ocean (Sirkin 1995, 1996). This variance is due to a glacier that covered only the North Shore of the island about 2.4 million years ago (Sirkin 1995, 1996). There are roughly 88 species of trees on Long Island (Karpen 1999), and although the climate is the same for the north and south shore, the effects from the glacier has an effect on the types of trees that are located on the island, and where they grow.

Methods:
The experiment commenced when we started to collect tree samples from the aforementioned locations on the island. We collected 20 samples from the property that is located on the North Shore in Port Jefferson Station, and also collected 20 samples from the property that is located on the South Shore. We took these tree samples and identified the species of each one using a dichotomous keys (Watts 1998; Petrides & Wehr 1998), and subsequently separated them into groups. We then compared our findings, and we looked for any similarities and/or differences of what was found on the North Shore and what was found on the South Shore. The latitude and longitude of the surveyed properties was found using www.usgs.gov and www.google.com/maps.

Results:
Observing tables 1 and 2 allow us to see the different species of trees that were collected on the properties. There were 20 tree samples taken from Port Jefferson Station, and they were as follows: 4 White Spruce (*Picea glauca*), 4 Eastern Hemlock (*Tsuga canadiens*), 2 Flowering Dogwood (*Cornus florida*), 2 Umbrella Magnolia (*Magnolia tripetala*), 4 Atlantic White Cedar (*Chemaecyparis*

Thyoides), and 4 Sugar Maple (*Acer saccharum*). There were 20 samples taken from the Central Islip property, and they were as follows: 3 Sycamore Maple (*Acer pseudoplatanus*), 3 Black Ash (*Fraxinus nigra*), 8 Arbor Vitae (*Thuga Occidentalis*), 3 Norway Maple (*Acer platanoides*), and 3 Colorado Spruce (*Picea pungens*). From our findings, we saw that there were no identical tree species found on both the north and the South Shore.

Table 1. Trees Found on North Shore Property 40.775233, -73202208

Number of Trees	Common Name	Scientific Name
4	White Spruce	*Picea glauca*
4	Eastern Hemlock	*Tsuga canadensis*
2	Flowering Dogwood	*Cornus florida*
4	Atlantic White Cedar	*Chemaecyparis thypetala*
4	Sugar Maple	*Acer saccharum*

Table 2. Trees Found on South Shore Property 40.775233, -73202208

Number of Trees	Common Name	Scientific Name
3	Sycamore Maple	*Acer pseudoplatanus*
3	Black Ash	*Fraxinus nigra*
8	Arbor Vitae	*Thuja occidentalis*
3	Norway Maple	*Acer platanoides*
3	Colorado Spruce	*Picea pungens*

Discussion:
Kim (2012) identified the following species in Smithtown: White Ash (*Fraxinus americana*) Red Pine (*Pinus resinosa*) and Virginia Pine (*Pinus virginiana*). When compared to our Port Jefferson Station location, the species found in Smithtown were not similar. The samples found in Port Jefferson Station were the White Spruce (*Picea glauca*), Eastern Hemlock (*Tsuga canadensis*), Flowering Dogwood (*Cornus florida*), Umbrella Magnolia (*Magnolia tripetalas*), Atlantic White Cedar (*Chemaecyparis thyoides*) and the Sugar Maple (*Acer saccharum*). The trees found on the South Shore property were compared to those found by Lennon & Palacios (2012) in Brentwood, N.Y., which is the next hamlet east of Central Islip. The species identified in their study were the Flowering Dogwood (*Cornus florida)*, Sugar Maple (*Acer saccharum*), and the White Cedar (*Chemaecyparis thypetala*). None of the species identified in their study in the Brentwood location was identified in our Central Islip location, but they were all found in our Port Jefferson Station location.

Conclusion:
There was 20 samples identified from Port Jefferson Station which included 4 White Spruce (*Picea glauca*), 4 Eastern Hemlock (*Tsuga canadiens*), 2 Flowering Dogwood (*Cornus florida*), 2 Umbrella Magnolia (*Magnolia tripetala*), 4 Atlantic White Cedar (*Chemaecyparis Thyoides*), and 4 Sugar Maple (*Acer saccharum*). There were 20 tree samples identified from Central Islip and they were 3 Sycamore Maple (*Acer pseudoplatanus*), 3 Black Ash (*Fraxinus nigra*), 8 Arbor Vitae (*Thuga Occidentalis*), 3 Norway Maple (*Acer platanoides*), and 3 Colorado Spruce (*Picea pungens*). From the different samples taken from the North Shore and the 20 samples taken from the South Shore we have concluded that some species of trees are more commonly found on the North Shore as opposed to the South Shore, and some species of trees are more commonly found on the South Shore than on the North Shore. Of the 40 trees identified in this study, none of the species found on the North Shore occurred on the South Shore.

In comparison to the study conducted by Lennon & Palacios (2012), we observed that 3 species of trees occurred on both the North Shore and on the South Shore: the Flowering Dogwood (*Cornus florida*), Sugar Maple (*Acer saccharum*), and the White Cedar (*Chemaecyparis Thyoides)*. By comparing to previous studies, we discovered that it is possible for trees that grow on the South Shore to grow on the North Shore, and vice versa. This allows us to observe that while Long Island is different depending on the shores because of the quality of the soil (rocky vs. not rocky), it also has similarities, allowing the same species of trees to grow on both shores simultaneously, depending on where on the North or South Shore the trees are being identified.

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Native Trees Outnumbered Non Native Trees on some Residential and Non Residential Properties across Long Island

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Keywords: Native, Non Native, Trees, Residential, Non Residential, Long Island

Abstract:

Forty-two trees were identified by species from multiple residential properties on Long Island. We identified Red Maple (*Acer rebrum*), Sweet Birch (*Betula lenta*), American Holly (*Ilex opaca*), Norway Maple (*Acer platanoldes*), Box Elder (*Acer negudo*), Red Cedar (*Juniperus virginiana*), American Beech (*Fagus grandifolia*), White Oak (*Quercus alba*), Northern White Cedar (*Thuja accidentalis*), Willow Oak (*Quercus phellos*), Silver Maple (*Acer platanoldes*), Atlantic White Cedar (*Chamaecyparis thyoides*), Sycamore (*Platanus occidentalis*) and English Holly (*Ilex aquifolium*) in Brentwood. Black Cottonwood (*Populus balsamifera*) and Hardy Catalpa (*Catalapa speciosa*) in West Babylon. English Holly (*Ilex aquifolium*), White Oak (*Quercus alba*), Black Maple (*Acer nigrum*), Sugar Maple (*Acer soccharum*), Norway Maple (*Acer platanolaes*), Silver Maple (*Acer saccharinum*), White Mulburry (*Marus alba*) and Sycamore (*Platanus occidentalis*) in Port Jefferson Station. American Beech (*Fagus grandifolia*), Persimmon (*Diospyros virginiana*), Sugar Maple (*Acer saccharum*), Redbud (*Cercis canadersis*), Northern White Cedar (*Thuja accidentalis*), Cherry Birch Tree (*Betula lenta*), Santa Lucia Fir or Brist Lecone Fir (*Ables bracteata*) in Plainview. Sycamore (*Platanus occidentalis*), American Beech (*Fagus grandifolia*) and Sugar Maple (*Acer soccharum*) in Lindenhurst. Japanese Maple (*Acer palmaatum*), European Maple (*Fagus sylvatica*), Redbud (*Cercis canadensis*) American White Birch (*Betula papyrufera*), Sugar Maple (*Acer soccharum*) and Silver Maple (*Acer saccharihum*) in Central Islip.

The trees were identified and confirmed using two dichotomous keys. After fully identifying each leaf, our results show there are more Native trees from our residential properties within each town than Pacific/Western trees. Our results showed 88.2 percent of trees were from a Native origin and 11.8 percent from a Western origin.

Introduction:

Long Island can go from 30.9 degrees Fahrenheit (-0.6 Celsius) to 74.6 degrees Fahrenheit (23.6 Celsius) in the coldest and warmest conditions (Tagliaferro 2015). For example, according to the Harris' Farmer's Almanac (Harris 2016) the month of January in the east region it is expected to be slightly above normal temperatures ranging from 23 Fahrenheit (-5 Celsius) in the west and north to 33 Fahrenheit (0.555556 Celsius) along the coast. However, in the summer time typically the month of August the weather is expected to be slightly below normal temperature ranging from 67 Fahrenheit (19.4444 Celsius) in the west and north 72 Fahrenheit (22.2222 Celsius) along the coast. Native Plants are evolved in a particular region over a long period of time and adapts to the climate, hydrology and geology of its region. Non- Native Plant are introduced to an environment in which they do not evolve, they are introduced deliberately or by accident (Cornell University 2015).

Method:

In order to determine the different varieties and classification of trees, branches were collected from specific properties across the North Shore and South Shore of Long Island. Three dichotomous keys (Petrides & Wehr 1998; Watts 1998, Watts & Watts 1970) were used to identify and confirm which type of trees had been collected. The information was then used to determine which trees would typically be found on the North Shore and South Shore of Long Island NY in the towns of Central Islip, Plainview, West Babylon, Brentwood, Port Jefferson Station and Lindenhurst. The latitude and longitude of each town was found using the US Geological Service Website found at usgs.gov. The trees were then classified based on whether they were native or non-native trees belonging to the Eastern Coast of the United States of America using PlantNative. (Sullivan et al. 2014)

Results:

The tables below show all the collected data of the trees that were observed and their locations. These trees were sampled from areas across Long Island's north and south shores in both Nassau and Suffolk County. Out of 41 different samples, 26 species of trees were identified. Most of the identified species originate on the east coast. Only four of the identified species originate from the West coast. They were the Black Cottonwood (*Populus balsamifera*), the Santa Lucia Fir or Bristlecone Fir (*Ables bracteata*), the Japanese Maple (*Acer palmaatum*) and the European Maple (*Fagus sylvatica*).

In Table 1, two different trees were identified in West Babylon. One of the West Coast species, the Black cottonwood (*Populus balsamifera*), and an East Coast species, the Hardy Catalpa (*Catalapa speciosa*).

Table 1-West Babylon Species (40.7679/ 73.4899)

Common Name	***Species***	**Origin**	**Town**
Black Cottonwood	*Populus balsamifera*	Western	West Babylon
Hardy Catalpa	*Catalapa speciosa*	Eastern	West Babylon

In Table 2, eight different species of trees were identified from Port Jefferson Station. Four out of the eight were from the genus *Acer*, which are mostly Maple trees. All the species identified in Port Jefferson Station originated from the East Coast.

Table 2- Port Jefferson Station Species (40.918433/ -73.02201500000001)

Common Name	***Species***	**Origin**	**Town**
English Holly	*Ilex aquifolium*	Eastern	Port Jefferson Station
White Oak	*Quercus alba*	Eastern	Port Jefferson Station
Black Maple	*Acer nigrum*	Eastern	Port Jefferson Station
Sugar Maple	*Acer soccharum*	Eastern	Port Jefferson Station
Norway Maple	*Acer platanolaes*	Eastern	Port Jefferson Station
Silver Maple	*Acer saccharinum*	Eastern	Port Jefferson Station
White Mulburry	*Marus alba*	Eastern	Port Jefferson Station
Sycamore	*Platanus occidentalis*	Eastern	Port Jefferson Station
White Oak	*Quercus alba*	Eastern	Port Jefferson Station

In Table 3, seven species of trees were identified from Plainview. Plainview is from Nassau County, or the Western part of Long island. One out of these seven species originated on the West coast, which is the Santa Lucia Fir, also known as the Bristlecone Fir (*Ables bracteata*). None of these seven species share a common genus.

Table 3- Plainview Species (40.7679/ 73.4899)

Common Name	***Species***	**Origin**	**Town**
American Beech	*Fagus grandifolia*	Eastern	Plainview
Persimmon	*Diospyros virginiana*	Eastern	Plainview
Sugar Maple	*Acer saccharum*	Eastern	Plainview
Redbud	*Cercis canadersis*	Eastern	Plainview
Northern White Cedar	*Thuja accidentalis*	Eastern	Plainview
Cherry Birch Tree	*Betula lenta*	Eastern	Plainview
Santa Lucia Fir (Brist Lecone Fir)	*Ables bracteata*	Western	Plainview

In Table 4, all the species identified from Lindenhurst were of Eastern origin. The Sycamore (*Platanus occidentalis*), American Beech (*Fagus grandifolia*), and the Sugar maple (*Acer soccharum*) were identified.

Table 4- Lindenhurst Species (40.6853/ 73.3722)

Common Name	***Species***	**Origin**	**Town**
Sycamore	*Platanus occidentalis*	Eastern	Lindenhurst
American Beech	*Fagus grandifolia*	Eastern	Lindenhurst
Sugar Maple	*Acer soccharum*	Eastern	Lindenhurst

In Table 5, six species were identified from Central Islip. There are two of the four identified west coast species. The Japanese Maple (*Acer palmaatum*) and the European Maple (*Acer sylvatica)*.

Table 5- Central Islip Species (40.7756/ -73.2035)

Common Name	***Species***	**Origin**	**Town**
Japanese Maple	*Acer palmaatum*	Non native	Central Islip
European Maple	*Fagus sylvatica*	Non native	Central Islip
Redbud	*Cercis canadensis*	Eastern	Central Islip

American White Birch	*Betula papyrifera*	Eastern	Central Islip
Sugar Maple	*Acer soccharum*	Eastern	Central Islip
Silver Maple	*Acer saccharihum*	Eastern	Central Islip

In Table 6, fourteen different species of trees were identified from Brentwood. The only trees that share a genus are the Red Maple (*Acer rebrum*), Norway Maple (*Acer platanoldes*), Box Elder (*Acer negudo*), and the Silver Maple (*Acer platanoldes*) which all belong to the genus *Acer*, and the American Holly (*Ilex opaca*) and the English Holly (*Ilex aquifolium*) which share the same genus of *Ilex*. All of the species identified in Brentwood originated on the East Coast.

Table 6- Brentwood Species (40.798009/78.237489)(40.75636/73.21912)

Common Name	***Species***	**Origin**	**Town**
Red Maple	*Acer rebrum*	Eastern	Brentwood
Sweet Birch	*Betula lenta*	Eastern	Brentwood
American Holly	*Ilex opaca*	Eastern	Brentwood
Norway Maple	*Acer platanoldes*	Eastern	Brentwood
Box Elder	*Acer negudo*	Eastern	Brentwood
Red Cedar	*Juniperus virginiana*	Eastern	Brentwood
American Beech	*Fagus grandifolia*	Eastern	Brentwood
White Oak	*Quercus alba*	Eastern	Brentwood
Northern White Cedar	*Thuja accidentalis*	Eastern	Brentwood
Willow Oak	*Quercus phellos*	Eastern	Brentwood
Silver Maple	*Acer platanoldes*	Eastern	Brentwood
Atlantic White Cedar	*Chamaecyparis thyoides*	Eastern	Brentwood
Sycamore	*Platanus occidentalis*	Eastern	Brentwood
English Holly	*Ilex aquifolium*	Eastern	Brentwood
American White Birch	*Betula papyrifera*	Eastern	Brentwood

Discussion:

In this study the species Black Cottonwood *(Populus balsamifera)* and the species Hardy Catalpa *(Catalapa speciosa)* were found in West Babylon. Deorag *et al.* (2012) also found the Black Cottonwood *(Populus balsamifera*) in West Babylon and other species including Eastern Hemlock

(Tsuga canadensis) and Atlantic White Cedar *(Chamaecyparis thyoides).*

In this study the species American beech *(Fagus grandifolia),* Persimmon *(Diospyros virginiana),* Sugar Maple *(Acer Saccharum),* Redbud *(Cercis canadensis),* Northern White Cedar *(Thuja occidentalis),* Cherry Birch Tree *(Betula lenta)* and Santa Lucia *(Abies bracteata)* were all found in Plainview. Bernero and Santiago (2013) found many trees in Plainview but the only one that was similar to ours was the Northern White Cedar *(Thuja occidentalis).*

In this study the species found in Lindenhurst include the Sycamore *(Plantanus occidentalis),* American Beech *(Fagus grandifolia)* and Sugar Maple *(Acer soccharum)*. Dolan and Mian (2014) also found these species.

In this study the species found in Central Islip include Japanese Maple *(Acer palmaatum),* European Maple *(Fagus sylvatica),* Redbud *(Cercis canaadensis),* American White Birch *(Betula papyrifera),* Sugar Maple *(Acer soccharum)* and Silver Maple *(Acer saccharum).* In Central Islip Romero and Flores (2012) found the White Birch. Townes and Billups (2013) found the Silver Maple. Bartlett (2014) found the Sugar Maple and Lizarraga (2014) found the Japanese Maple.

In this study the species found in Brentwood include Red Maple *(Acer rebrum),* Sweet Birch *(Betula lenta),* American Holly *(Ilex opaca),* Norway Maple *(Acer platanoldes),* Box Elder *(Acer negudo),* Red Cedar *(Juniperus virginiana),* American Breech *(Fagus grandifolia),* White Oak *(Quercas alba),* Northern White Cedar *(Thuja accidentalis),* Willow Oak *(Quercas phellos),* Silver Maple *(Acer platanoldes),* Atlantic White Cedar *(Chamaecyparis thyoides),* Sycamore *(Platanus occidentalis) and lastly* English Holly *(Ilex aquifolium).* Cutrone et al. (2012) also found the Norway Maple in Brentwood. Other investigators including Deorag et al. (2012) found the Red Cedar, and Leiva and Fernandes (2012) found the Silver Maple. Brentwood did have the most variety of trees in our study and other investigators had many tree species from Brentwood as well.

Conclusion:

Out of the 40 trees in this study only 10% were found to be of Western origin while the rest were trees from Eastern origin. Most species were found individually on each property. The species *Acer soccharum* was found three times, once in Lindenhurst, once in Central Islip, and once in Port Jefferson which made it the most common species we found. In West Babylon, 50% were Western trees and 50% were Eastern trees. In Plainview, 85.7% were Eastern while the rest were Western. In Central Islip 66.6% were Eastern trees. 100% of the trees in Port Jefferson Station, Lindenhurst and Brentwood were Eastern trees. These results show that we found more Eastern trees than Western on the properties studied.

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Maple Trees Show Dominance Over A Variety of Species in Residential Areas in Kings Park, Commack, Brentwood, and Central Islip on Long Island, New York

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Keywords: Maple, Dominance, Kings Park Commack, Brentwood, Islip

Abstract:
Forty six tree samples were taken from residential properties in Kings Park, Commack, Brentwood, and Central Islip on Long Island, New York. These samples were then identified using two dichotomous keys, the "Tree Finder Booklet" (Watts 1998) and "A Field Guide to Eastern Trees" (Petrides & Wehr 1998). It was found that the property in Kings Park has sixteen different species of trees. Five are Maples. The property in Commack has fourteen species of trees. Four are Maples. The property in Brentwood has two different species of trees. Both are Maples. The property in Central Islip has four different species of trees. Two are Maples. There are thirty six species of trees on these properties. Maples are the most dominant being thirty percent of the total sample.

Introduction:
Long Island's climate can be characterized into four categories; a humid subtropical climate (Cfa), humid continental climate (Dfa), oceanic climate(Cfb), and a subtropical highland climate (Strahler 1984). Oceanic and subtropical highland climates can only be found in the Eastern most parts of Long Island by Montauk and the Hamptons. Going East to West, Long Island is 108 miles long, so it may not be surprising that the East and West experience different climates, especially since Nassau County is closer to New York City and has warmer general temperatures due to urban heat (Moran 2005 B). The island is only 23 miles wide at its widest point but there is still a difference in climates. This is due to the North Shore being on the Long Island Sound and the South Shore being on the bay and Atlantic Ocean. In the winter, the Atlantic Ocean sends warm air up to the South Shore and as a result the South Shore is warmer in the winter, leading to more rain when the rest of the island gets snow. In the summer, the South Shore is cooler than the North Shore due to sea breezes (Moran 2005 B). While Long Island may not be considered large in comparison to the rest of New York State, there are many factors that allow for different climates within the small expanse of land. Due to the difference in climates there are a variety of tree species on Long Island. Maple trees are well populated on Long Island. Maples (*Acer spp.*) are an important group of forest trees in New York State. Sugar Maple (*Acer saccharum*) is the state tree (Cope et al. 2002). Also, Maples provide syrup, valuable hardwood timber, wildlife foods, beautiful fall colors, lawn trees, and watershed protection.

Method:
Forty six tree samples were taken from four residential properties on Long Island, NY. Samples were taken from Kings Park, Commack, Brentwood, and Central Islip. Information such as location, latitude, longitude, elevation, and size of property were collected about each property using the mobile app, "Where Am I At?" (Bauer 2016) and were verified using earthexplorer.usgs.org (USGS 2016). Two separate dichotomous keys were then used to determine what tree species were collected. The "Tree Finder Booklet" (Watts 1998) was used first followed by "A Field Guide to Eastern Trees" (Petrides 1998) for verification.

Results:
Among forty six trees there were thirty six different species showing a wide variety. Fourteen trees were Maples making up for thirty percent of the sample. Other recurring species were two Sassafras (*Sassafras albidum*), two Flowering Dogwood (*Cornus florida)*, three Atlantic White Cedar (*Criamaecyparis thyoide*s), and two European Larch (*Larix decidua*).

Table 1: Property Information

Town	Latitude	Longitude	Elevation	Size
Kings Park, NY	40 53’ 10” N	073 13’ 17” W	36.72 m	3380 square meters
Commack, NY	40 52’ 00” N	073 16’ 01” W	50.25 m	1349 square meters
Brentwood, NY	40 46’ 10” N	073 12’ 50” W	23.00 m	1052 square meters
Central Islip, NY	40 47’ 27” N	073 12' 56” W	23.05 m	3270 square meters

Table 1 shows the location, latitude, longitude, elevation, and size of the properties in which tree samples were taken from.

Table 2: Samples Found on Kings Park Property

Type of Tree	Scientific Name	Quantity
Scarlet Oak	*Quercus coccinea*	1
Sassafras	*Sassafras albidum*	1
Sugar Maple	*Acer saccharum*	3
Common Pear	*Pyrus communis*	1
Spanish Oak	*Quercus falcata*	1
Post Oak	*Quercus stellata*	1
Blue Beech American Hornbeam	*Carpinus carolinia*	1
Cockspur Hawthorne	*Crataegus crus-galli*	1
American Plum	*Prunus americana*	1
Balsam Poplar	*Populus balsamifera*	1
Black Locust	*Robinia pseudo-acacia*	1
Hardy Catalpa	*Catalpa speciosa*	1
Norway Maple	*Acer platanoides*	2
Flowering Dogwood	*Cornus florida*	1
Redbud	*Cercis canadensis*	1

Type of Tree	Scientific Name	Quantity
American Beech	*Fagus grandifolia*	1

Table 2 shows that there are sixteen different species of trees on this property in Kings Park, New York, three of which are Sugar Maples *(Acer saccharum)* and two of which are Norway Maples (*Acer plantanoides*) making five Maples in total.

Table 3: Samples Found on Commack Property

Type of Tree	Scientific Name	Quantity
Siberian Chinese Elm	*Ulmus pumila*	1
Silver Maple	*Acer saccnarinum*	1
Swamp Cotton Wood	*Populus heterophyila*	1
American Plum	*Prunus americana*	2
Flowering Dogwood	*Cornus florida*	1
European Larch	*Larix decidua*	2
Red Maple	*Acer rubra*	1
Atlantic White Cedar	*Criamaecyparis thyoides*	3
Norway Maple	*Acer platanoides*	2
White Spruce	*Picea glauca*	1
Douglas Fur	*Psevdotsuga menziesii*	1
Red Cedar	*Thuja*	1
Peach Leaved Willow	*Salix amygclaloides*	1
Sour Wood	*Oxydendrum arboreum*	1

Table 3 shows that there are fourteen different species of trees on this property in Commack, New York. Two of which are Norway Maples (*Acer plantanoides*), one of which is a Silver Maple (*Acer saccnarinum*), and another one is a Red Maple (*Acer rubric)*, making four Maples in total.

Table 4: Samples Found on Brentwood Property

Type of Tree	Scientific Name	Quantity
Sycamore Maple	*Acer pseudo-platarius*	1
Sugar Maple	*Acer saccharum*	2

Table 4 shows that there are two species of trees on this property in Brentwood, New York, all of which are Maples.

Table 5: Samples Found of Central Islip Property

Types of Trees	Scientific Name	Quantity
Red Oak	*Quercus rubra*	1
Red Maple	*Acer rubra*	2
Sassafras	*Sassafras albidum*	1
Post Oak	*Quercus stellata*	1

Table 5 shows that there are four different species of trees on this property in Central Islip, New York, two of which are Red Maples (*Acer rubra*).

Discussion:
In this study it was found that Maples were the most dominant tree species being thirty percent of forty six trees. Puca et al. (2013) found a Silver Maple (*Acer saccharinum*) on their property in Commack, Long Island. In Brentwood, a Sugar Maple Tree (*Acer saccharum*) was found by Siddiqui et al. (2013) as well as different variety of tree species. Perez and Fuentes (2015) collected tree samples from Kings Park, Belmont Lake State Park, and Lindenhurst and found that Maples were the dominant trees among the variety that live in central, North, and South Long Island. Their results showed that forty one percent of the forty four tree samples collected were Maples making it the dominant tree on the Island. In another study it was found that many of these species were found to be exotic or non-native (Muran 2015 A). By comparing the results of others experiments to our findings we can concur that Maple trees are dominant amongst the variety of tree species that exist on Long Island.

Conclusion:
Out of forty six tree samples collected from four residential properties there are thirty six different species. Fourteen are Maples (*Acer*) making up thirty percent of the sample and they are the most recurring species. Other recurring species are two Sassafras (*Sassafras albidum*), two Flowering Dogwood (*Cornus florida)*, three Atlantic White Cedar (*Criamaecyparis thyoides*), and two European Larch (*Larix decidua*).

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The Sugar Maple is a Dominant Tree Species Found on Residential Properties in Northport New York

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Keywords: Sugar Maple, Trees, Northport, New York, Long Island

Abstract:
Forty-three trees were identified from two different residential properties in Northport, New York. This town is on the North Shore of Long Island. The species of trees were identified using a dichotomous key (Watts, 1998), and then confirmed with a smart phone app called *Tree Finder* (Helmut Design Pty Ltd, 2015). On the first residential property, a total of twenty-five trees were classified. Eleven of them were identified as Sugar Maples (*Acer saccharum*). The other trees found were six flowering dogwoods (*Cornus florida*), four American Larch's/ Tamaracks (*Larix laricina*), and four Black Ash's (*Fraxinus nigra*). On the second property, a total of eighteen trees were classified. On this property, seven of the eighteen trees were Sugar Maples (*Acer saccharum*). The other trees found were five Chestnuts (*Castanea dentata*), three American Larch's/ Tamaracks (*Larix laricina*), and three Box Elder (*Acer negundo*). It was discovered that the most dominant tree species on both residential properties is the Sugar Maple (*Acer saccharum*), covering forty three percent of tree species on the two properties.

Introduction:
Being that both of the residential properties that the tree samples were taken from were not only coming from the same town, but within a few miles from each one another, it was hypothesized that there would be a similarity in the species of the trees.

The following information regarding tree species is reviewed in the Arbor Day Foundation (2016). The Sugar Maple (*Acer saccharum*) is a deciduous that can range anywhere from sixty to seventy five feet in height. It is one of New York's more dominant species of trees and it is not only loved for the maple syrup it provides, but also the way it becomes a crisp orange shade during autumn. The Flowering Dogwood (*Cornus Florida*) is a small deciduous tree going up to thirty-three feet high. They carry pink or red petals, with a large white head. The American Larch/ Tamarack (*Larix Laricin*), is a medium sized tree that has needles. The Black Ash (*Fraxinus Nigra*) is also a medium sized tree that is deciduous. The Chestnut tree (*Castanea Dentana*) is a deciduous tree that is native that is closely related to the Oak tree. The Box Elder (*Acer Negundo*), is a native tall tree with a thick trunk.

Methods:
Forty-three different trees were classified from two different residential properties located in Northport, NY, on the North Shore of Long Island. The tree samples were found at the following residential properties; Latitude: 40 degrees 54' 10' North, Longitude: 073 degrees 20' 54' West, measuring one thousand three hundred thirty five meters squared, and Latitude: 40 degrees 53' 39' North, Longitude: 073 degrees 20' 52' West, measuring at eight hundred fifty meters squared. A dichotomous key (Watts, 1998) was used to identify the tree species, followed by a smartphone application (Helmut Design Pty Ltd, 2015) to confirm the data.

Results:

Table 1, Latitude and Longitude

Address:	Coordinates:
102 Highland Avenue, Northport NY, 11768, US	Latitude: North 40 degrees 54' 10' Longitude:073 degrees 20' 54' West
10 Franklin Street, Northport NY, 11768, US	Latitude: 40 degrees 53' 39' North Longitude: 073 degrees 20' 52' West

Table 2, names of trees and amount that was found.

Trees	Name	Scientific Name
18 (Found on both properties).	Sugar Maple	*Acer saccharum*
6	Flowering Dogwood	*Cornus florida*
7 (Found on both properties).	American Larch/ Tamaracks	*Larix laricina*
4	Black Ash	*Fraxinus nigra*
5	Chestnut	*Castanea dentana*
3	Box Elder	*Acer negundo*

The Sugar Maple (*Acer saccharum*) is a dominant species found in Northport. Forty two percent of the total forty-three trees that were sampled were the Sugar Maple (*Acer saccharum*). The American Larch (*Larix laricina*) was also a dominant tree on both properties. The residential properties were one thousand, seven hundred, and seventy meters apart.

Discussion:

Perez and Fuentes (2015) found that the dominant genus on Long Island is the Maple (*Acer).* The Maple species that was the most dominant on the two residential properties that I sampled was a different species, however it still came from the same genus. The species I found dominant was the Sugar Maple (*Acer saccharum*). Perez and Fuentes' study found the Red Leaf Maple (*Acer rubrum*), Norway Maple (*Acer platanoides*), Big Leaf Maple (*Acer macrophylum*), and the Silver Maple (*Acer saccharinum*).

Conclusion:

This study shows that the Sugar Maple (*Acer saccharum*) may be the most dominant species of any tree in Northport, followed by the American Larch/ Tamarack (*Larix laricina*). Both of these trees were found on each residential property that was sampled. The Sugar Maple is forty two percent of the tree population on the two residential properties,

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There is a Greater Variety of tree Species in Lindenhurst than Farmingdale, NY

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Keywords: Tree species, Farmingdale, Lindenhurst, Dichotomous key, Suffolk County

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Abstract:

In two towns on Long Island NY, there were a total of 45 tree specimens that were identified for this study. These towns were Lindenhurst and Farmingdale, New York. From the 40 trees identified, there was a total of 18 tree species. The following trees were identified using two dichotomous keys. The residential property in Lindenhurst had three Red Cedars *(Juniperus virginara*), one White Mulberry (*Morus alba*), two Eastern Hemlocks *(Tsuga canadensis),* one Shingle oak *(Quercus imbricavia*), three Arborvitae (*Thuja occidentalis*), two Flowering Dogwoods (*Cornus florida*,) one White Oak (*Quercus alba*), two Sycamores (*Platanus occidentalis*), two Common Elderberries (*Sambucus candensis*), two Small Leaf Viburnum (*Viburnum obovatum*), one Sugar Maple (Acer sacharum), three Blue Ash, *(Fraxinus quadrangulata*), one Sourwood (*Oxdendrum arboreum*) and one American Mountain Ash (*Sorbus americana*) The residential property in Farmingdale has 11 Arborvitaes (*Thuja occidentalis*), seven Eastern Hemlocks (*Tsuga canadensis*) six White Oaks (*Quercus alba*), one Mimosa Silk Tree (*Albizia julibrissin*), and two Santa Lucia Fir (*Abies bracteata*). These results clearly show that the residence in Lindenhurst, NY has a greater variety of tree species than the residence in Farmingdale, NY.

Introduction:

Long Island has a vast variety of tree species native to the area. I compared different tree types in two different towns, Lindenhurst, New York and Farmingdale New York. Different soil types create an environment, which these species need to adapt and survive. The environment itself also impacts the rate of survival for each tree species. According to a report by Achim and Shurr, (2004), it also impacts the color of the leaves of each tree not just based on season, but to the amount of moisture and nutrients that are found in most soils. Long Island is divided between the North and South Forks. There are two soil types that are mainly on the North Fork, Carver-Plymouth-Riverhead Association and Haven-Riverhead Association (NRCS 2015). Compared to the North Fork, the South Fork has roughly five different soil types. The soil names are Plymouth-Carver, Bridgehampton-Haven, Montauk-Montauk, Sandy Variant-Bridgehampton, Montauk, Sandy Variant-0 Plymouth and Montauk-Haven-Riverhead Association (NRCS 2015). The Haven- Riverhead Association soil type found in the North Fork of Long Island is the main soil type of the neighborhood in Farmingdale with 10 to 15 percent slopes and grading. The neighborhood in Lindenhurst has the same soil type of Haven-Riverhead Association but with cut and fill land samples and gentle slopes

Methods:

One student was involved in this study. Tree branches were collected from two residential properties using a branch cutter. Tree branch samples were cut containing at least 3 leaves off of each tree on the properties. In total he cut down 20 branches from the property in Lindenhurst, and 20 branches from the property in Farmingdale. After collecting the samples, the student identified and cross-referenced his samples using two two dichotomous keys (Watts 1991; Peterson 1998). These references were used to identify each tree sample including the species, common name, and whether it was native to North Eastern United States or not. From gathering the data and the tree branches, each property was looked at a number of times to test out how healthy each tree was. The strength and durability of branches and leaves were tested as well as the types of leaves on the trees of each property. The leaves' colors were analyzed from early fall to early winter. The colors of all the leaves were written down as data. The United States Geological Survey website was used to identify the coordinates for both properties and common leaves found in those areas. (USGS 2015)

Results:
Through these results, I concluded that the property in Lindenhurst, New York, is more diverse with tree findings compared to that of the property of Farmingdale, New York due to the different types recorded on each property located in both table 1 and 2. Table 1 is based off a total of 22 trees found on the property in Lindenhurst, NY and Table 2 is based off a total of 23 trees found as well on the property in Farmingdale, NY. Even though both households are in separate towns on Long Island, NY, they do share a common trait having mainly native trees on the property and only one not native on each.

Table 1- Property in Lindenhurst, NY

Common Name	Species	# of Species	Native/Not Native
Common Elderberry	*Sambucus canadensis*	2	Native
Sugar Maple	*Acer saccharum*	1	Native
Small Sugar Maple	*Viburnum oboratum*	1	Native
Common Elderberry	*Sambucus canadensis*	1	Native
American Mountain Ash	*Sorbus americana*	1	Not Native
Sourwood	*Oxdendrum arboreum*	2	Native
Blue Ash	*Fraxinus quadrangulata*	3	Native
Sycamore	*Platanus occidentalis*	1	Native
Arbor Vitale	*Thuja occidentalis*	1	Native
Shingle Oak	*Quercus imbricaria*	1	Native
Eastern Hemlock	*Tsuga canadensis*	1	Native
White Mulberry	*Morus alba*	1	Native
Red Cedar	*Juniperus virginiana*	3	Native
White Oak	*Quercus alba*	1	Native
Flowering Dogwood	*Cornus florida*	2	Native

Table 2- Property in Farmingdale, NY

Common Name	Species	# of Species	Native/Not Native
Arbor Vitale	*Thuja occidentalis*	4	Native
Easter Hemlock	*Tsuga canadensis*	4	Native

White Oak	*Quercus alba*	4	Native
Mimosa Silk Tree	*Albizia julibrissin*	5	Not Native
Santa Lucia Fir	*Abies bracteata*	5	Native

Tables 3 and 4 below show the types of leaves, colors, and healthiness of the leaves where they were not affected by the change in climate or season on the properties on Long Island, New York. The healthiness of the leaves and rich color depends on how rich the soil is with moisture and nutrients. The significant color changes of the leaves were recorded throughout a fall college semester. The colors of the leaves also show if the branches are strong or not. Residential properties are home to many native and non-native tree species. All 45 tree species identified in this report are native except for one tree on each property. I was able to find the exact locations of each property using geographical technology based on their latitude and longitude as well as sea level affecting the climate the trees are in. These results also show that the property in Lindenhurst has healthier trees and soil with more moisture as well as brighter color leaves.

Table 3: Leaf colors and healthiness from property in Lindenhurst, NY

Leaf Group	Healthy/Unhealthy	Color	Moist Soil/Dry Soil	Strong/Weak Branches
1	Healthy	Bright colors consisting of green, red and orange.	Moist	Strong
2	Healthy	Same bright colors. A few darker than most. Mainly dark red.	Moist	Strong
3	Unhealthy	Dark colors of red, orange, and some even brown. Leaves are very dry and break easily	Dry	Weak
4	Healthy	Bright colors as the first 2 groups	Moist	Strong

Table 4:

Leaf Group	Healthy/Unhealthy	Color	Moist Soil/Dry Soil	Strong/Weak Branches
1	Unhealthy	Brown and dark	Dry	Weak

		orange leaves. Dry with many holes.		
2	Unhealthy	Same as first group except more dark green leaves. Dry like others but do not break as easily	Dry	Weak
3	Healthy	Bright colors: Red, orange, yellow, green.	Moist	Strong
4	Healthy	Majority bright green	Moist	Strong

Discussion:

According to a report by Walberg et al. (2014) Suffolk County displays a variation of Oak trees similar to Farmingdale's residential properties. The trees in this report were recorded mainly in north, south, and central Long Island. The results included four White oaks (*Quercus alba*) and three Flowering Dogwoods (*Cornus florida*). The White Oak was found in both the Suffolk and Nassau properties.

A report by Perks et al. (2013) Deer Park displays a variation of tree species both similar and non-similar to the Lindenhurst property. The trees in this report were recorded from the north and south shores of Long Island. The results include one Colorado Spruce (*Picea pungens*), one Norway Maple (*Acer platanoides*), one Red Maple (*Acer rubrum*), one Flowering Dogwood (*Cornus florida*), one Japanese Maple (*Acer)*, one Shortleaf Pine (*Pinus enchinata*), one Southern Magnolia (*Magnolia gandi flora)*, one Weeping Juniper (*Juniper flaccida*), one White Spruce (*Picea glauca*), one Flowering Plum (*Prunus subhirtella*), one Weeping Cherry (*Prunus subhirtella*), one Bradford Pear (*Pyrus calleryana*). The Flowering Dogwood (*Cornus florida*) was found among the Lindenhurst, North Shore, and South Shore properties.

Conclusion:

There were 45 samples from two different towns in Suffolk County that were collected and identified by using two dichotomous keys. These samples were collected from Lindenhurst, NY and Farmingdale, NY. A total of 17 different species were found. Based on the results, White Oak, Eastern Hemlock, and Arbor Vitae were found on both properties. Blue Ash and Red Cedar were the trees most common on the Lindenhurst property with three samples each, while the Mimosa Silk Tree and the Santa Lucia Fir were the most common on the Farmingdale property with five samples each. The most variety of trees in one residential property is Lindenhurst with 15 different species, while the property in Farmingdale had five. From the 45 trees identified, all except one different species on each property were native to Long Island. The property on Lindenhurst had soil that was moister than the property of Farmingdale. It is closer to the beaches, bays, and water. The soil on the Farmingdale property was drier. It wasn't as close to water as the other. The residential property in Lindenhurst had a larger variety of tree species compared to Farmingdale's residential property with Lindenhurst having more samples than Farmingdale.

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Coniferous Trees are Dominant on the North Shore of Long Island, while Deciduous Trees are Dominant on the South Shore

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Key Words: Coniferous, Deciduous, North Shore, South Shore

Abstract:

Trees branches with leaves were collected in the township of Huntington, New York which is located on the North Shore of Long Island and Bay Shore which is located on the South Shore of Long Island, in the county of Suffolk. Plant and tree species were classified and confirmed with the use of three dichotomous keys.

The first location is on a 0.5 acre parcel of residential land in Greenlawn, while the second located in Huntington proper is 1 acre and third, located in Bay Shore is 2.5 acres. The following species were classified in Greenlawn: Black Ash (*Fraxinus nigra*), Flowery Dogwood (*Cornus florida*), Box Elder (*Acer negundo*), European Larch (*Larix decidua*), Pin Cherry (*Prunus pensyvanica*), Red Cedar (*Juniperus virginana*), Atlantic White Cedar (*Chamaecyparis thyoides*), Arbor Vitae (*Thuja occidentails*), Black Locust (*Robinia pseudo*), Sour Gum (*Nyssa sylvatica*), Copperbeech (*Fagussylvatica purpunea*), Hardy Catalpa (*Catalpa speciousa*), and Eastern Cottonwood (*Populus deltoides*). The following were classified in Huntington proper: Black Tupelo (*Nyssa sylvatica*), American Elm (*Ulmus americana*) , Pin Chery (*Prunus* pensylvanica), Black Cherry (*Prunus serotina*), Mountain Ash (*Sorbus americana*), Quaking Aspen (*Populus tremuloides*), Red Elm (*Ulmus rubra*), Red Ceder (*Juniperus virginiana*), White Pine (*Pinus strobus*), Flowery Dogwood (*Cornus florida*), Red Spruce (*Picea rubens*). Species found on the South Shore in Bay Shore included: Red Maple (*Acer rubrum*), Downy Serviceberry (*Amelanchier arborea*), Hornbean (*Carpinus caroliniana*), Trailing Arbutus (*Epigaea repens*), White Ash (*Fraximus oleaceae*), Red Mulberry (*Morus fubra*). The percent of coniferous trees on the North Shore was 90% while the percentage of deciduous on the South Shore was 100%.

Introduction:

The plant and tree species in this study were found in the township of Huntington on the North Shore of Long Island, including the towns, Greenlawn and Huntington. Tree and plant information for the following was collected from the VTree App created by Virginia Tech Department of Forest Resources and Environmental Conservation (2015). The Black Ash is a small to medium sized tree reaching 40 to 50 feet. Flowery Dogwood is a small tree with a short trunk which branches are low. The Box Elder is a medium sized tree that can reach up to 60 feet. European Larch is a deciduous tree with well-formed and straight stems, Pin Cherry is considered a small to medium height tree reaching a maximum of 30 feet in height, Red Cedar is a small tree with dense ovoid reaching up to 60 feet (V-Tree). Atlantic White Cedar grows slender when young and spire-like branches. Arbor Vitae are evergreen trees that can grow from 10 to 200 feet tall, Black Locust is a medium sized tree that can grow to 70 feet whose leaves resemble sprigs of grapes, Sour Gum reaches a staggering 80 feet in moist climates and is generally shorter in the mountains, Copperbeech is a medium to large tree that grows up to 100 feet tall with a rounded crown, Hardy Catalpa is a medium sized tree with spreading crooked branches, and finally the Eastern Cottonwood is a large tree with clear bole and an open spreading crown, Acer Platanoides is a medium to large tree that can grow to be 90 feet tall, with a trunk up to five feet wide, American Elm is a large tree that can reach 100 feet tall, simple leaves with teeth-like edges and a trunk that can reach four feet wide, Black Cherry ranges from 50 to 80 feet tall, with a trunk anywhere from two to four feet wide, blooms white flowers seasonally. Mountain Ash is a small ornamental tree, which reaches up to 30 feet tall and a one foot wide trunk, has a serrated leaf margin and blooms white flowers, Quaking Aspen is a medium tree that grows 40 to 50 feet tall and has a trunk that grows one foot wide, leaves have small rounded teeth, Red Elm is a medium sized tree, reaching 40 to 60 feet tall that may have multiple trunks and oblong leaves, Spruce is a coniferous tree, reaching 40 to 60 feet tall often used as Christmas tree, Red Maple grows up to 90 feed, crown rounded with bright red leaves, Downy Serviceberry is a small tree up to 40 feet with a narrow crown, Hornbeam is a small tree reaching to 35 feet with a rounded crown and twisted trunk, Trailing Arbutus is low growing, creeping, wood herb with large leaves which are all visible, White Ash is a large tree growing up to 80 feet tall that typically develops a straight, clear bole, usually with a narrow oblong crown. The Red Mulberry is a small tree which is about 60 feet tall with a short trunk that typically branches low. According to Vtree (2015), small trees are from 40 to 60 feet in height, medium trees go from 60 to 90 feet in height, and large trees are from 90 to 120 feet in height.

Methods:

Thirty specimens were found, including twenty-seven various species and were classified from three geographical locations, two in the township of Huntington, New York and one in the Town of Islip, in Bay Shore New York. Each species was numbered. A dichotomous key assisted in the evaluation and classification of each plant and tree species. Each leaf and branch was observed for all visible characteristics. These characteristics included shape, structure, and overall size. The species were then identified using *Tree Finder: A Manual for the Identification of Trees by Their Leaves* (Theilgaard-Watts 1998) or *Winter Tree Finder: A Manual for Identifying Deciduous Trees in Winter* (Theilgaard-Watts 1998). Findings were further confirmed according to *The Peterson Field Guide to Eastern Trees* (Petrides & Wehr 1998). All data was then recorded in Tables 1, 2, and 3 listing the organism number, the species name, and the common name. The longitude and latitude were found using the Earthexplorer (USGS 2016).

Results:

The coordinates for the first locations in Greenlawn are 40°51’9.6” N - 73°22’51.6” W, the coordinates for the property in Huntington are 40°54’10’’N - 73°23’57’’ W and the coordinates for Bay Shore are 40 43’ 30 N - 073 14’ 14” W (earthexplorer.usgs.gov). The following species were identified in the geographic location of Greenlawn ,40°51’9.6” North and 73°22’51.6” West, Huntington proper, 40°54’10’’N. and 73°23’57’’ W, and 40 °43’ 30 North and 73°14’ 14” West in Bay Shore. Seven trees were deciduous while 27 were coniferous.

Table 1: Trees and Plants found in Greenlawn in the Huntington Township- North Shore, Long Island

Coniferous (Yes/No)	***Species Name***	**Quantity**	**Common Name**
Yes	*Fraxinus nigra*	1	Black Ash
Yes	*Cornus florida*	2	Flowery Dogwood
Yes	*Acer negundo*	1	Box Elder
Yes	*Larix decidua*	1	European Larch
Yes	*Prunus pensyvanica*	1	Pin Cherry
Yes	*Juniperus virginiana*	1	Red Cedar
Yes	*Chamaecyparis thyoides*	1	Atlantic White Cedar
Yes	*Thuja occidentails*	1	Arbor Vitae

Yes	*Robinia pseudo*	1	Black Locust
Yes	*Nyssa sylvatica*	1	Sour Gum
Yes	*Fagussylvatica purpunea*	1	Copperbeech
Yes	*Catalpa speciousa*	1	Hardy Catalpa
Yes	*Populus deltoides*	1	Eastern Cottonwood

Table 2: Tree and Plants found in Huntington proper- North Shore, Long Island

Coniferous (Yes/No)	*Species Name*	Quantity	Common Name
Yes	*Nyssa sylvatica*	1	Sour Gum
Yes	*Ulmus americana*	1	American Elm
Yes	*Prunus pensylvanica*	1	Pin Cherry
Yes	*Prunus serotina*	1	Black Cherry
Yes	*Sorbus americana*	1	Mountain Ash
Yes	*Populus tremuloides*	1	Quaking Aspen
Yes	*Ulmus rubra*	1	Red Elm
No	*Juniperus virginiana*	1	Red Cedar
Yes	*Pinus strobus*	1	White Pine
Yes	*Cornus Florida*	2	Flowery Dogwood
Yes	*Picea rubens*	1	Red Spruce

Table 3: Trees and Plants found in Bay Shore- South Shore, Long Island.

Coniferous (Yes/No)	*Species Name*	Quantity	Common Name
No	*Acer rubrum*	1	Red Maple
No	*Amelanchier arborea*	1	Downy Servicebery
No	*Carpinus caroliniana*	1	Hornbean
No	*Epigaea repens*	1	Trailing Arbutus
No	*Fraximus oleaceae*	1	White Ash
No	*Morus fubra*	1	Red Mulberry

Discussion:

When comparing the findings of tree and plant species located on the north shore of Long Island in the town of Huntington on the North Shore and Bay Shore located on the South Shore to investigators (Thomas et al., 2014), we found many parallels and disparities. These investigators found that the South Shore is dominant in deciduous trees which is what our results concluded. Other similarities found came from the findings of Altenburg & Hempel (2013). They also found that the North Shore of Long Island had a density of the tree species, Red Cedar (*Juniperus virginiana*), Atlantic White Cedar *(Chamaecyparis thyoides*) as well as Arborvitae (*Thuja occidentalis*). These same species were located on the Greenlawn and Huntington parcels of land. They also found that Black Spruce and Honey Locus were present on the North Shore of Long Island, which we did not. Messina et al. (2014), identified there was Honey Locust, Black Spruce, Arbor vitae, and Horse

Chestnut in Huntington. Our results only confirmed Arbor Vitae being located in Greenlawn Huntington with no findings of Honey Locust, Black Spruce, and Horse Chestnut. However, Anda & Donnelly (2013) found Red Maple to be common to Bay Shore just as we did.

Conclusion:

In this study, thirty different plant species were found at three specific geographical locations. These locations were Greenlawn in the town of Huntington, Huntington proper and Bay Shore, New York. The species were identified with three dichotomous keys. The following are tree species found in the town of Huntington; Black Ash (*Fraxinus nigra*), Flowery Dogwood (*Cornus florida*), Box Elder (*Acer negundo*), European Larch (*Larix decidua*), Pin Cherry (*Prunus pensyvanica*), Red Cedar (*Juniperus virginana*), Atlantic White Cedar (Chamaecyparis thyoides), Arbor Vitae (*Thuja occidentails*), Black Locust (*Robinia pseudo*), Sour Gum (*Nyssa sylvatica*), Copperbeech (*Fagussylvatica purpunea*), Hardy Catalpa (*Catalpa speciousa*), and Eastern Cottonwood (*Populus deltoides*), American Elm (*Ulmus americana*), Black Cherry *(Prunus serotina*), Mountain Ash (*Sorbus americana*), Quaking Aspen (*Populus tremuloides*) ,Red Elm (*Ulmus rubra*), White Pine (*Pinus strobus*), Red Spruce (*Picea rubens*). The following are tree species found in Bay Shore;Red Maple (*Acer rubrum*), Downy Serviceberry (*Amelanchier arborea*), Hornbean (*Carpinus caroliniana*), Trailing Arbutus (*Epigaea repens*), White Ash (*Fraximus oleaceae*), Red Mulberry (*Morus fubra*). 90% of trees found on the North Shore of Long Island were Coniferous trees. This supports that Conifers are dominant on the North Shore. It was also found that 100% of the trees collected on the South Shore were deciduous, concluding that deciduous trees are dominant on the South Shore of Long Island.

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Comparative Characterization of Soil Bacteria from the Nature Preserve at the Michael J. Grant Campus of Suffolk County Community College, Brentwood, New York

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Keywords: Soil, Bacteria, Antibiotic, Morphology, Gram Stain, Bacilli

Abstract:
The purpose of this study was to analyze and interpret the bacterial composition of two distinct soil environments. The Nature Preserve located at the Michael J. Grant Campus of Suffolk Community College (Brentwood) was used as a common location to collect and analyze diverse soil samples and characterize the bacterial population in these samples. Sample 9 was collected from the base of a large tree in a shaded environment, while Sample 5 was collected from natural grass inhabited soil directly exposed to sunlight. Sample 9 consisted primarily of gram positive bacilli, where some of these bacteria exhibited the development of endospores. Sample 5 was more diverse in species, containing both gram positive and gram negative bacilli. In addition, certain species of bacteria from sample 5 were found to produce antibiotics that inhibited the growth of some of the other bacteria in the sample.

Introduction:
Bacteria are ubiquitous such that they are found in the air, water, soil, and even multicellular organisms including humans. It is estimated that over ten thousand species of bacteria have yet to be cultured and identified from within the soil alone (Schloss & Handelsman, 2004). Due to the bacterial species diversity, plants and other soil inhabitants are capable of flourishing. Some bacteria provide nutrients to plants by processing the organic matter in the soil (Lowenfels & Lewis 2010; Ehlers 2011). Likewise, the presence of eukaryotic plants drastically changes the development of bacterial species, and can influence their production of volatile chemicals (Garbeva et al. 2014). Large plant structures and excess root effluents have been shown to reinforce bacterial growth, but limit diversity (Schlatter et al. 2015). *Pseudomonas fluorescens* is even capable of using plant-root excreted substance, alpha-pinene, as its sole carbon source (Kleinheinz et al. 1999). A general widespread nutrient availability could apply a weaker selective pressure on bacterial species and lead to a more diverse soil biome. Much like mammalian ecology, microbial life is exposed to a number of behavioral and environmental pressures that shape the evolution within their habitat. The soil biome is a limited nutrient environment that forces bacterial species into competition over the same resources (Garbeva et al. 2014). Within the soil, some species go as far to develop inhibitory extracellular chemicals, such as antibiotics, against neighboring species (Laskaris et al. 2010). Antibiotics, in particular, play an extensive role in the war-like developments that influence soil bacterial growth. Akin to the man-made weaponry seen today, antibiotic production and resistance coevolution is an arms race at the microscopic level (Laskaris et al. 2010). Both *Bacillus* and *Streptomyces* are common antibiotic producing bacterial species, often used by scientists today to isolate new effective antibiotic variants (Ozgur et al. 2008).

Methods:
Soil samples, 5 and 9, were obtained from within the Nature Preserve of Suffolk County Community College, Michael J. Grant Campus by using sterile equipment, petri dishes, and aseptic procedure. Sample 5 was collected from a wide open section of the Nature Preserve (Latitude 40^{o}, 48’ 10.974378” N; Longitude 73^{o}, 16’ 28.554412” W) bordered by a line of small shrubs, and various berry producing plants. The soil was packed, coarse, and dry in consistency, with several species of grass growing directly into the top soil and a multitude of larger, berry producing plant species in the surrounding area. Sample 9 was collected just off a trail within the nature preserve (Latitude 40^{o}, 48’ 10.053291” N; Longitude 73^{o}, 16’ 32.504300” W) that had ample shade provided by the enclosing tree canopy. The soil was a soft, loose, and dry consistency, with a complex network of roots throughout, and a thin top

layer of leaves and pine needles. Around the dig site was 1.2 meters of clearance devoid of plant species excluding a single large tree, outside of which was a series of small shrub species.

One gram from each sample was diluted with distilled water at 1:10, 1:100, 1:1,000 and 1: 10,000 dilutions. One hundred microliters of each concentration was inoculated onto Tryptic Soy Agar (TSA) and MacConkey Agar plates, and incubated at 30^{o}C for 24 hours. After incubation the plates were observed for bacterial growth and colony morphology. Distinct colonies were labeled and isolated, and gram staining was performed on the bacteria from these colonies to ascertain the cell morphology. Cells were observed and documented by using a bright-field compound microscope with a 100x magnification oil emersion lens.

Results:
Brentwood sample 5 produced 6 distinct colonies. Some of these colonies had gram positive bacilli while some colonies had gram negative bacilli. Colony 3, colony 4, and colony 5 (Fig. 1) were all isolated from the sample 5, plated on TSA plate. Colony 3 was observed to have punctiform colonies with a smooth margin and the colonies were shiny and white. Observation of colony 3 through gram staining (Fig. 1a) showed gram positive diplobacilli. Colony 4 was circular with umbonate elevation, an entire margin, a mucoid opaque surface, and distinct golden chromogenesis. Upon gram staining of colony 4 (Fig. 1b), it was noted to have gram negative short bacilli, which primarily exhibited diplobacilli arrangement. Colony 5 from that same plate was observed to have circular colonies, with convex elevation and smooth margins, exhibiting a glistening, and opaque surface. The gram stain of colony 5 (Fig. 1c) revealed a gram positive, streptobacilli, that formed curved chains ranging from 4 to 13 cells in length. It was also noted that colony 5 was regularly producing an antibiotic chemical effective at inhibiting the growth of colony 3 but not colony 4 (Fig. 6). Several members of colony 3 were observed to potentially develop resistance to the antibiotic chemical from colony 5 (Fig. 7), growing within the zone of inhibition. Colonies 7 and 8 (Fig. 2) were isolated from sample 5 off the 1:1,000 dilution TSA plate. After isolation, colony 7 was spreading on the plate and it was shiny. Observation of colony 7 through gram staining (Fig. 2a) showed gram negative bacilli that existed as single cells. Colony 8 exhibited circular colonies with raised elevation, a unique filamentous margin, and a dull, dry, opaque surface. Colony 8 was the only one of its type to have a non-moist surface, and was shown to inhibit the growth of colony 7, evident from the clearing around the colony (Fig. 8). Upon gram staining of the sample from colony 8 (Fig. 2b), the cells were observed to be gram positive bacilli existing as single cells. Some of the cells were gram negative in appearance, but they had clear areas within them suggesting endospore formation. Colony 1 (Fig. 3) was observed on the 1:10,000 dilution MacConkey agar from sample 5, and from the dark pink color, exhibiting lactose fermentation. These colonies, on TSA plate, were circular, convex in elevation, entire in margin, with a glistening, translucent surface (Fig 3b). The gram stain (Fig. 3a) showed gram negative bacilli, which primarily existed in the arrangement of diplobacilli.

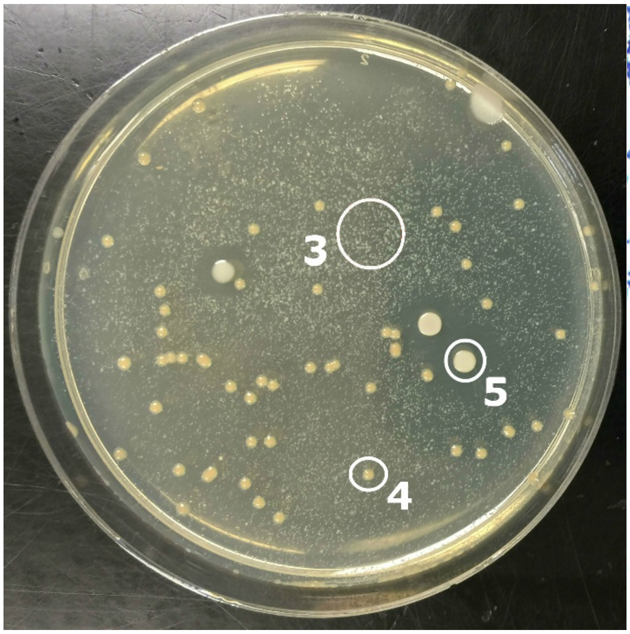

Figure 1: Sample 5, 1:10,000 Dilution, TSA.
Colony 3, 4, and 5.

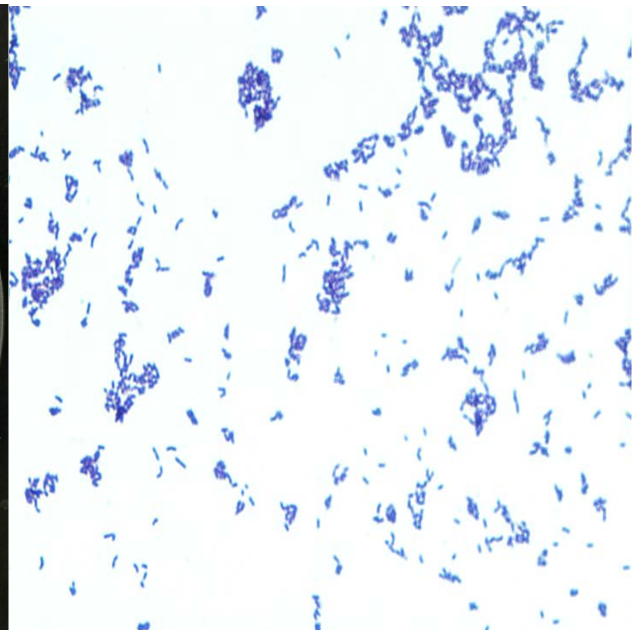

Figure 1a: Sample 5, Colony 3 Gram Stain.
1000x Magnification.

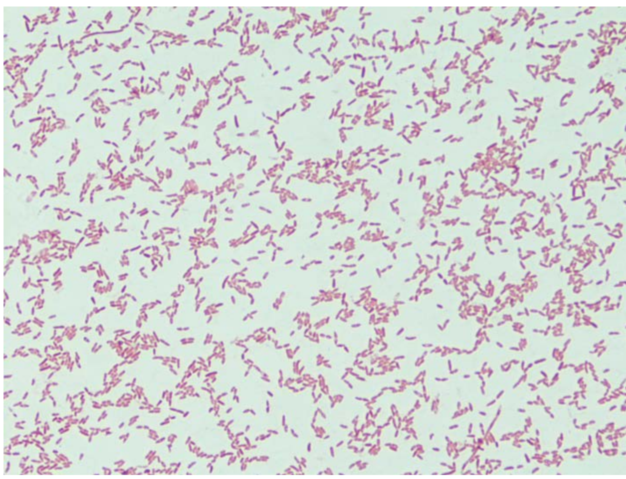

Figure 1b: Sample 5, Colony 4 Gram Stain.
1000x Magnification.

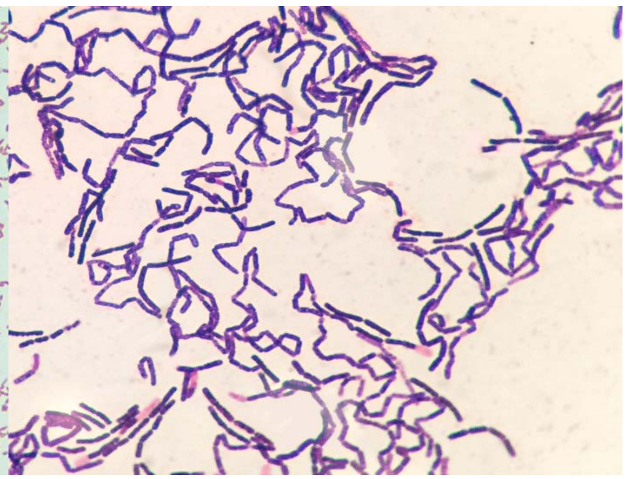

Figure 1c: Sample 5, Colony 5 Gram Stain.
1000x Magnification.

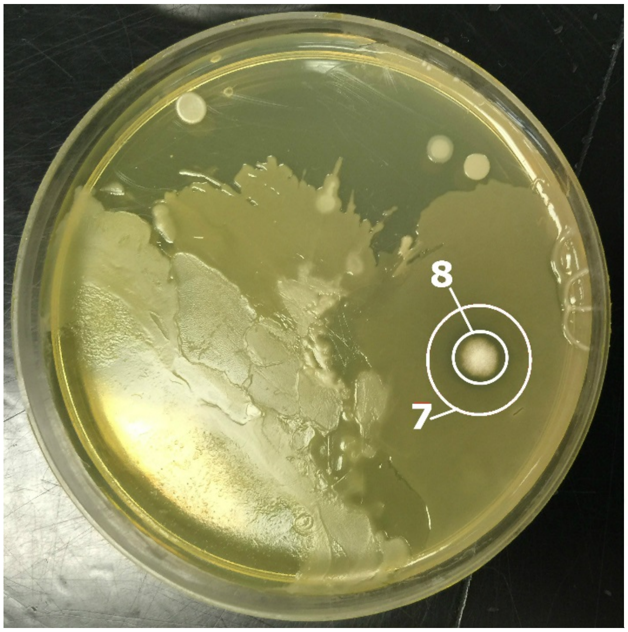

Figure 2: Sample 5, 1:1,000 Dilution, TSA.
Colony 7 and 8.

Figure 2a: Sample 5, Colony 7 Gram Stain.
1000x Magnification.

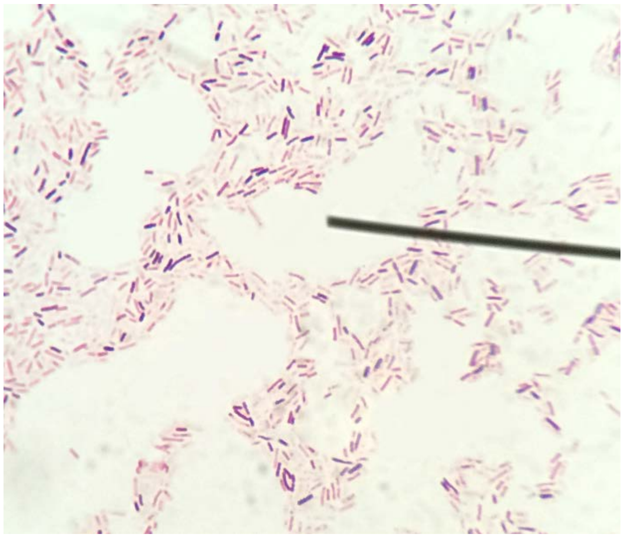

Figure 2b: Sample 5, Colony 8 Gram Stain.
1000x Magnification.

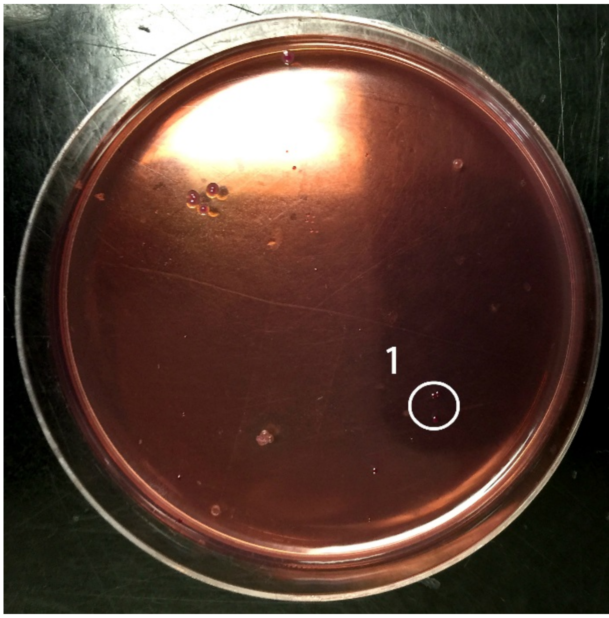

Figure 3: Sample 5, 1:10,000 Dilution, MacConkey. Colony 1.

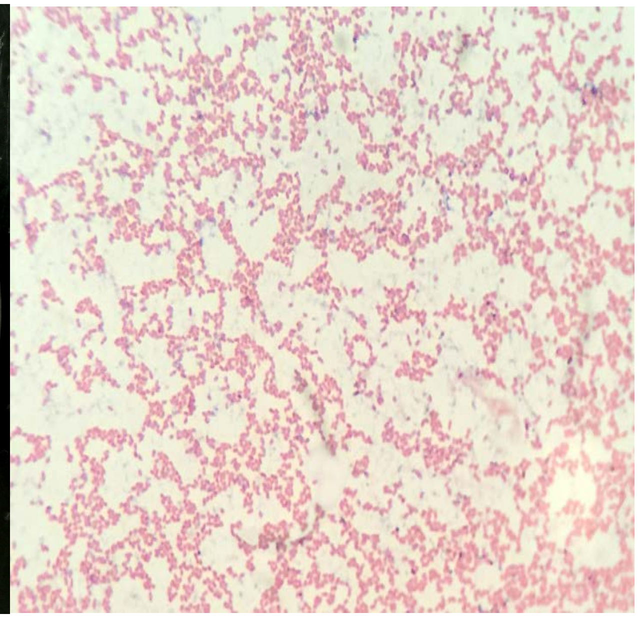

Figure 3a: Sample 5, Colony 1 Gram Stain. 1000x Magnification.


Figure 3b: Sample 5, Colony 1 TSA Isolation from MacConkey 1:10,000 Dilution.

Brentwood sample 9 only exhibited 4 distinct colonies which were all found to be gram positive bacilli in different arrangements. Colonies 2a and 3a (Fig. 4) were both obtained from the 1:1,000 dilution of the sample on the TSA plate. Colony 2a was observed to have circular colonies, convex elevation, and an entire margin, with a glistening, translucent surface. Gram staining of colony 2a (Fig. 4a) revealed short, gram positive, bacilli, that had a palisade arrangement. Colony 3a exhibited circular colonies, with a raised elevation, undulate margin, a dull, opaque surface. Upon gram staining of the sample from colony 3a (Fig. 4b), it was observed to have gram positive, streptobacilli, arranged in long straight chains consisting of at least 7 cells. Colonies 4a and 5a (Fig 5) were both obtained from sample 9. Colony 4a was with umbonate elevation, an irregular margin, a glistening, mucoid surface. The gram stain of colony 4a (Fig. 5a) was also gram positive, elongated, bacilli, but arranged as diplobacilli. Colony 5a exhibited circular colonies with a plateau elevation and entire margin, glistening surface. The gram staining of colony 5a showed another gram positive, short bacilli.

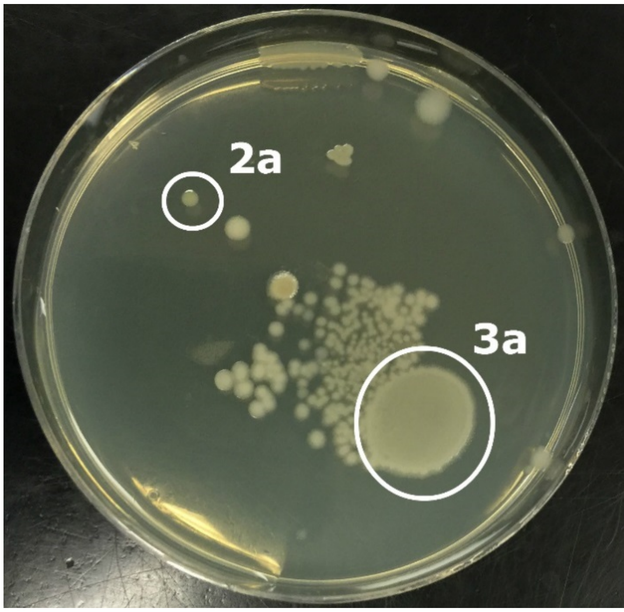

Figure 4: Sample 9, 1:1,000 Dilution, TSA.

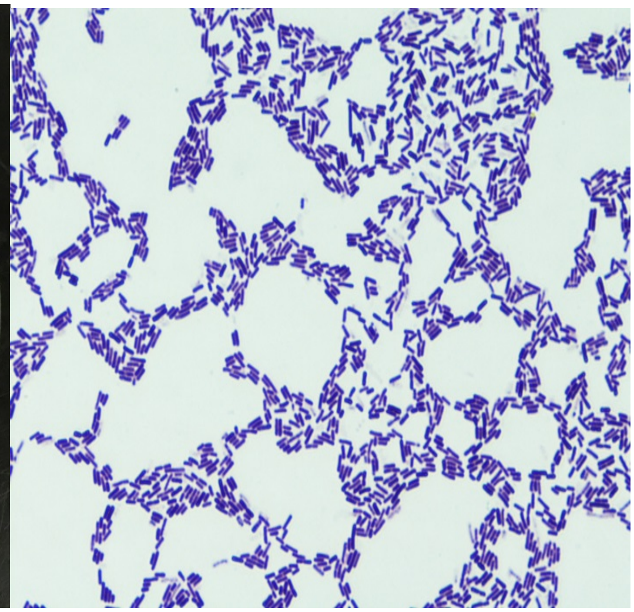

Figure 4a: Sample 9, Colony 2a Gram Stain.

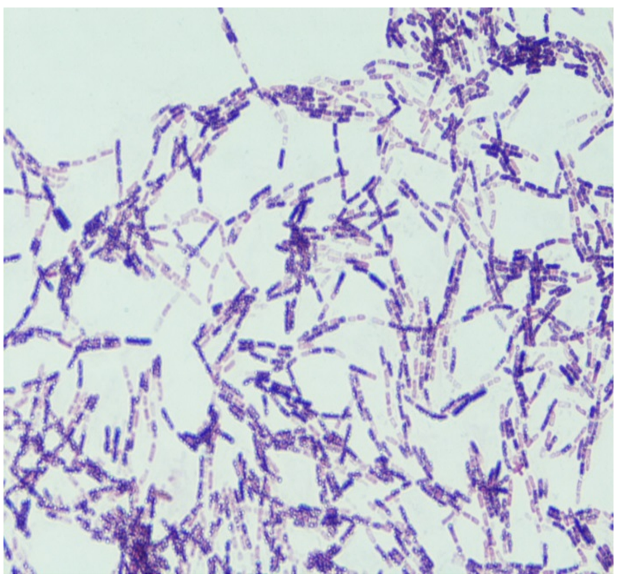

Figure 4b: Sample 9, Colony 3a Gram Stain.
1000x Magnification.

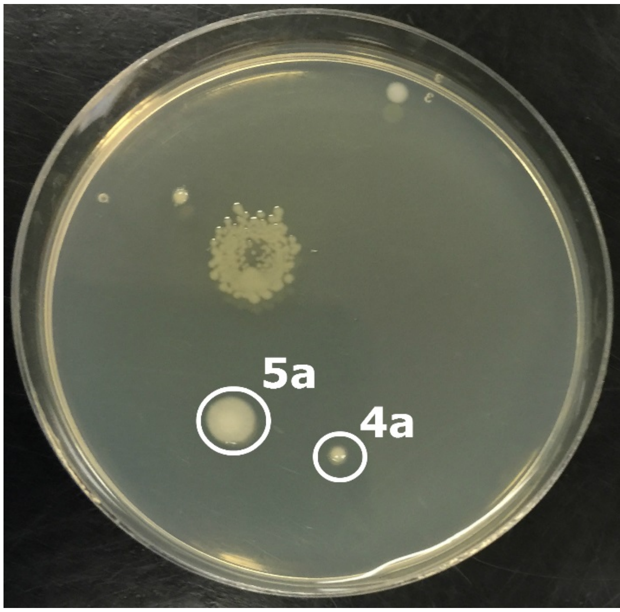

Figure 5: Sample 9, 1:10,000 Dilution, TSA.
Colony 4a and 5a.

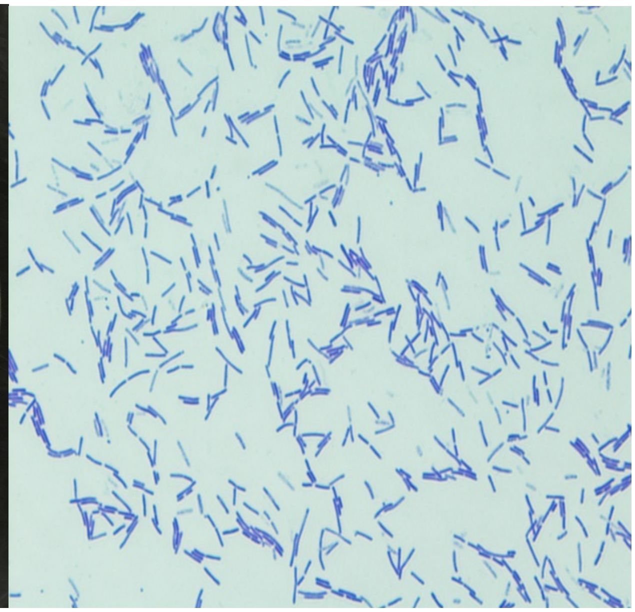

Figure 5a: Sample 9, Colony 4a Gram Stain.
1000x Magnification

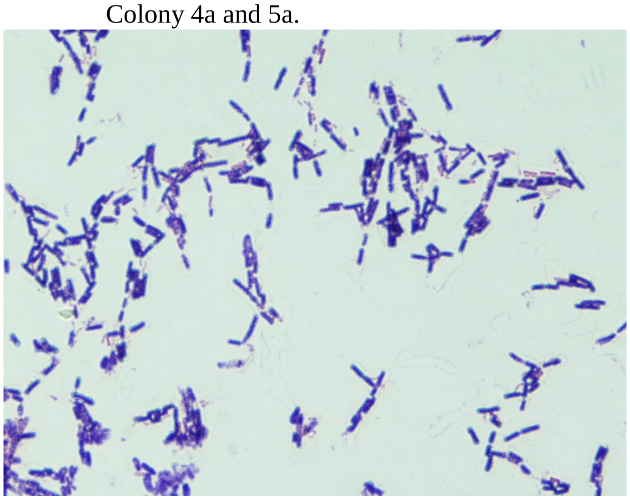

Figure 5b: Sample 9, Colony 5a Gram Stain.
1000x Magnification.

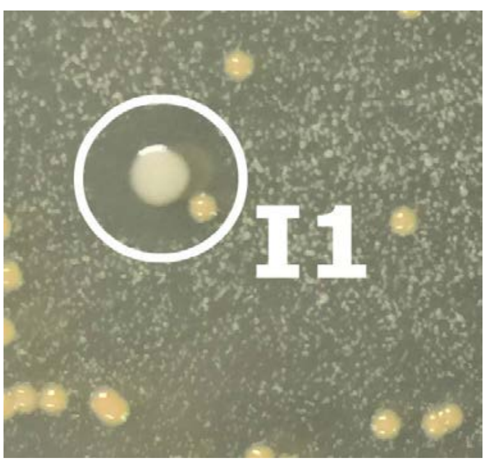

Figure 6: Sample 5, 1:10,000 Dilution, TSA.
Colony 5 Zone of Inhibition I1.

Figure 7: Sample 5, Colony 4a Gram Stain.
Colony 5 Zone of Inhibition I2

Figure 8: Sample 5, 1:1,000 Dilution, TSA.
Colony 8 Zone of Inhibition I3.

Discussion:
In some respects, the soil samples from both sites, 5 and 9, were comparable to one another in terms of the bacterial population. Both samples exhibited a variety of bacilli. The similarity is expected due to the close geographical nature of the two samples, but there were also some distinctions observed between them. Sample 9 consisted of gram positive bacilli, where some colonies exhibited the development of endospores. Sample 5 was more diverse in species, containing both gram positive and gram negative bacilli. In addition, the colonies from sample 5 exhibited several species of bacilli secreting antibiotic chemicals to inhibit neighboring colonies, indicating a more nutrient competitive environment. It is possible that the presence of the numerous grass species from site 5 led to both a matching increase in bacterial diversity and depletion of the limited nutrients, as the ecological complexity rose. Comparatively, sample 9 was collected from a richer appearing soil that was littered with fallen leaves and needles adding to the nutrient availability. Sample 9 was also under more uniform conditions in terms of eukaryotic plant inhabitants, which consequently seemed to lead to a more limited number of species. It has been shown that particular bacteria are directly beneficial to large poplar trees, and that these trees can, to a degree, actively select for the bacterial species within the soil (Taghavi et al., 2008). Antibiotic producing bacteria were isolated from a different part of Brentwood on Long Island, New York, by another group of investigators as well (Bonn et al. 2015). These investigators have also found that the antibiotic producing bacterial species was found in a sample that exhibited more diversity in the bacterial population.

Conclusion:
Sample 9 had only gram positive bacilli while sample 5 had both gram positive and gram negative bacilli. Sample 5, which had more diverse species of bacteria, also had the antibiotic producing bacterial species. Further research can be performed to analyze the antibiotic chemicals produced by these bacteria. Specifically, the interactions between colonies 3, 4, and 5 can be analyzed to understand the resistance of colony 4 against the antibiotics produced by colony 5. In addition, resistance that appeared across some examples of colony 3 can be investigated to gain more understanding of antibiotic resistance. These interactions may give some clue as to the development of future clinical antibiotics that function against resistant bacterial strains.

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The Effect of Polymyxin B on the Rate of Regrowth in Planaria and Tadpoles

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Abstract:

Teratogens are any agents that can induce or increase the incidence of congenital malformation. In our study, we decided to test the effect that teratogens have on the rate of regeneration in two species; planaria and tadpoles. We used six planaria and six tadpoles. An experimental group was exposed to polymyxin B, and a control group was in spring water. Each group was done in biological replicates to enable for statistical analysis. Our results indicated that polymyxin B did slow the rate of regeneration but more research will need to be conducted in order to determine whether polymyxin B can be considered a teratogen.

Introduction:

Regeneration is the regrowth of lost or destroyed parts or organs within an organisms' body. In this study, regeneration was studied within the planarian and the tadpole.

In a planarian, regeneration is done by means of differentiating cells. When the planarian loses a segment of its body, a blastema forms. A blastema is an area of cells that have embryonic properties and are filled with stem cells. These stem cells are able to differentiate into many kinds of cells and in large numbers. These cells continually divide and differentiate into the missing portion of the organisms' body (Rink 2013)

Planaria regeneration and tadpole regeneration are intricate processes. The first step in planaria regeneration is wound closure and wound healing. Muscular contractions of the body wall help to close the wound. Epithelium begins to cover the wound and heals it. Once the wound had healed, a blastema begins to form. The blastema is an accumulation of undifferentiated cells that eventually differentiate into the cells of the missing body part. These cells are called neoblasts and they are highly mitotic. Tadpole regeneration occurs by nonvacuolated cells surrounding the notochord. Undifferentiated mesenchyme-like cells, resembling the blastema, accumulate around the wound. The cells begin to differentiate and the tail starts to grow back. Tadpoles have a notochord, which lies above the spinal cord. If the spinal cord is damaged, regeneration can still occur however, the ganglia associated with the spinal cord will not regenerate (Beck et al. 2009).

A teratogen is any agent that can induce or increase the incidence of a congenital malformation. A congenital malformation is any anatomical or structural abnormality present at birth. Examples of teratogens are nicotine, alcohol, tetracycline, retinoic acid, thalidomide, and polymyxin B (Chung 2004).

For our experiment, we used polymyxin B, an antibiotic used to treat bacterial infections such as eye infections, meningitis, and blood infections (Yuan and Tam 2008). It does this by altering the bacterial cell wall structure causing cellular contents to leak out of the cell, which can lead to cell death. The effects of this teratogen are pain, redness, and if used with other drugs, can harm the kidneys and nerves. For our experiment in both the planarian and the tadpoles, we hypothesized that our teratogen, polymyxin B, would stunt the rate of regrowth. For each experiment, the independent variable was the amount of teratogen given to each organism and the dependent variable was the rate of regrowth in relation to the amount of teratogen.

Materials and Methods:

Set up and polymyxin B solution

A six well plate was set up in biological triplicates with three wells filled with spring water and three filled with spring water plus polymyxin B tablet at a 0.01 Molar solution per species.

Planarian
From the planaria jar, 6 planarians were sucked up with a plastic pipette and put into separate Petri dishes already containing spring water. Each of the 6 planaria was measured to obtain an original measurement before amputation. While in the petri dish the planaria were cut in half. Ice water and ice was used as a topical anesthetic. Only the anterior portion of the planaria was kept and put into the 6 well plate. The posterior end was discarded. The 6 well plate had 3 ml of water in the control side and 3 ml of solution in the experimental side. Once the head was placed in these dishes, another measurement of the length was taken. Over the course of the week the planaria were measured for re-growth the data was recorded and plotted.

Tadpole
From the tadpole tank, 6 tadpoles were tricked into entering a 50 ml conical tube and put into separate Petri dishes already containing spring water. Each of the 6 tadpole tails were measured to obtain an original measurement before amputation. The tail was cut at the mid-point. Ice water and ice was used as a topical anesthetic. The 6 cut tadpoles were then put into the 6 well plate. The 6 well plate had 3 ml of water in the control side and 3 ml of solution in the experimental side. Once the tadpoles were placed in these dishes, another measurement of the length was taken. Over the course of the week the tails were measured for re-growth the data was recorded and plotted.

Results:

Table 1. Growth of Tadpoles. Each tadpole tail was measured in centimeters daily to monitor the growth rate.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Experimental 1	0.5	0.5	0.5	0.6	0.6	0.65	0.7	0.7
Experimental 2	0.5	0.5	0.5	0.6	0.6	0.65	0.7	0.7
Experimental 3	0.4	0.4	0.5	0.55	0.6	0.65	0.7	0.7
Control 1	0.5	0.5	0.6	0.65	0.7	0.75	0.8	0.9
Control 2	0.5	0.5	0.55	0.6	0.65	0.7	0.7	0.8
Control 3	0.4	0.5	0.6	0.6	0.65	0.7	0.7	0.8

Graph 1. Growth of tadpoles

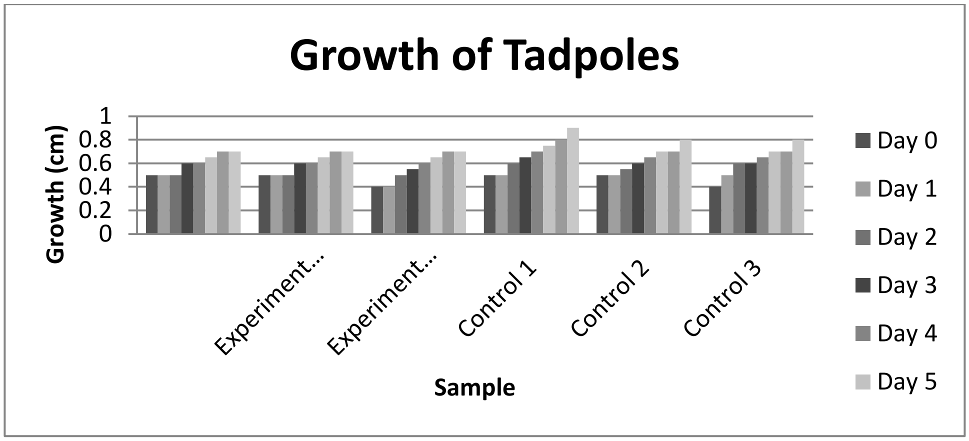


Table 2. Percent Regrowth of Tadpoles. See calculations section below. Percentage of regrowth compared original length of tadpole tail.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Experimental 1	0	0	0	20	20	30	40	40
Experimental 2	0	0	0	20	20	30	40	40
Experimental 3	0	0	25	37.5	50	62.5	75	75
Control 1	0	0	20	30	40	50	60	80
Control 2	0	0	10	20	30	40	40	60
Control 3	0	25	50	50	62.5	75	75	100

Table 3. Average percent re-growth of tadpoles. Average percent regrowth of experimental and control group. Average C is control group and Average E is experimental. The control group has a higher average regrowth rate compared to the experimental group.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Average E	0	0	8.33	25.8	30	40.8	51.7	51.7
Average C	0	8.33	26.7	33.3	44.2	55	58.3	80

Graph 2. Average growth of tadpoles

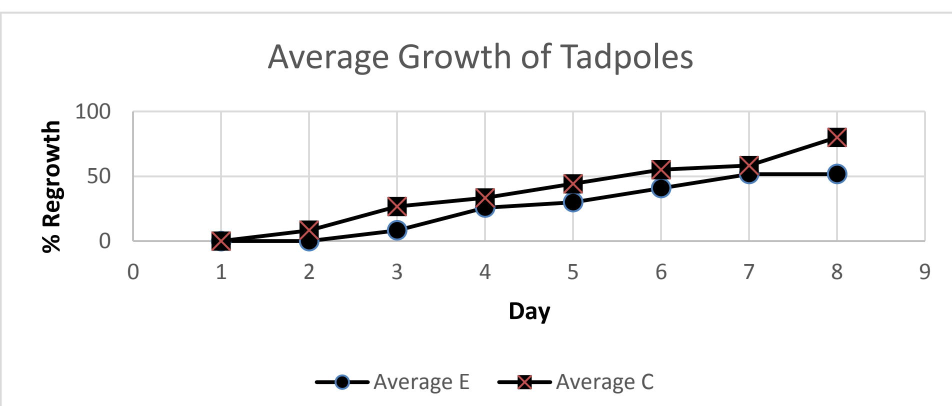


Table 4. Growth of Planaria. Growth of Planaria was measured in centimeters daily across seven days.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Experimental 1	1	1	1	1	1	1	1	1
Experimental 2	1	1	1	1	1	1	1	1
Experimental 3	0.8	0.8	0.85	0.9	0.95	1	1	1.1
Control 1	1	1	1	1	1	1	1	1
Control 2	1	1	1	1	1	1	1	1
Control 3	0.7	0.75	0.75	0.8	0.85	0.9	0.95	1

Graph 3. Growth of planaria

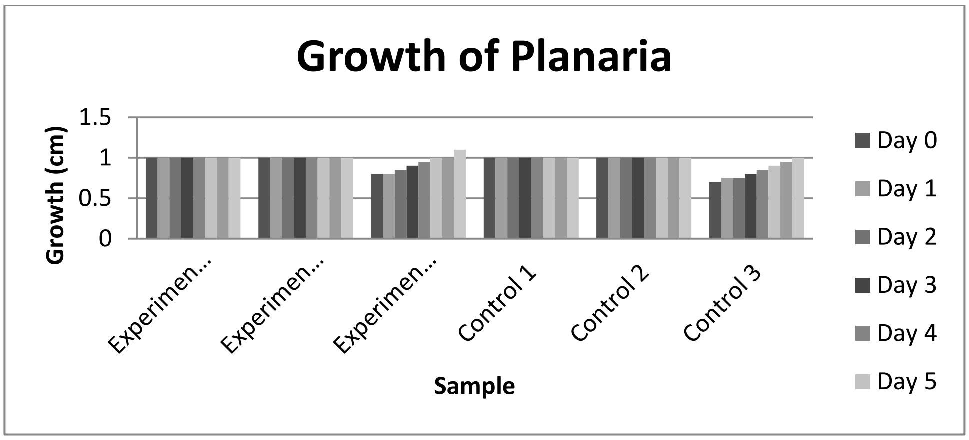


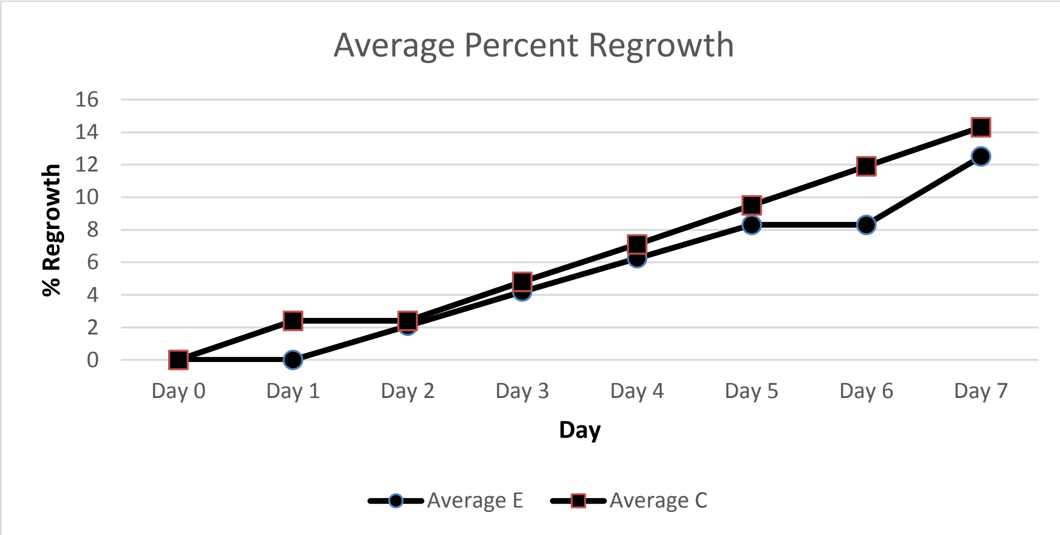
Table 5. Percent Regrowth of Tadpoles. See calculations section below. Percent regrowth of tadpoles compared to the original length of the tail.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Experimental 1	0	0	0		20	30	40	40
Experimental 2	0	0	0	20	20	30	40	40
Experimental 3	0	0	25	37.5	50	62.5	75	75
Control 1	0	0	20	30	40	50	60	80
Control 2	0	0	10	20	30	40	40	60
Control 3	0	25	50	50	62.5	75	75	100

Table 6. Average Percent Regrowth of Planaria. Average percent regrowth of planaria. Average E is the experimental group. Average C is the control group. In comparison, the control group has a higher percent regrowth.

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Average E	0	0	2.1	4.2	6.25	8.3	8.3	12.5
Average C	0	2.4	2.4	4.8	7.1	9.5	11.9	14.3

Graph 4. Average percent re-growth Graph of data from Table 6. The control group has a slightly higher percent regrowth.



Calculations:

Percent Regrowth: (Final – Initial) / (Initial) x 100

Tadpoles:
Experimental 1 Day 3: (0.6 cm – 0.5 cm) / (0.5 cm) x 100 = 20%
This formula was used to calculate the percent regrowth in each trial for the tadpole experiment.

Planaria:
Experimental 3 Day 2: (0.85 cm – 0.8 cm) / (0.8 cm) x 100 = 6.25%
This formula was used to calculate the percent regrowth in each trial for the planaria experiment.

Discussion:
The purpose of this study was to determine whether polymyxin B has a teratogenic effect by examining the rate of regeneration of planaria that had been cut in half and tadpole which had 50% of their tails cut off. Our hypothesis was that polymyxin B would have a teratogenic effect on both the planaria and the tadpoles by decreasing the rate of regrowth. After seven days of measuring the length of the planaria and the tadpoles, our data suggests that polymyxin B does reduce the rate of regrowth in planaria and tadpoles. There is not a significant difference between polymyxin B and spring water, but the planaria and tadpoles that were present in spring water regrew at a faster rate compared to the planaria and tadpoles in polymyxin B. We stopped after seven days because two of the experimental tadpoles died and we had enough data to make our graphs. Polymyxin B could have been affected the neoblasts or the blastema in planaria and the undifferentiated mesenchyme-like cells in the tadpoles therefore reducing the rate of regrowth. Based on our results, it seems that polymyxin B has an effect on the rate of regrowth. There is not a lot of information regarding polymyxin B as a teratogen. Therefore, more experiments must be done in order to determine if polymyxin B does have a teratogenic effect on organisms.

Conclusion:

The purpose of this lab was to determine whether polymyxin B has a teratogenic effect on the rate of regrowth of planaria and tadpoles. Our hypothesis was that polymyxin B would have a teratogenic effect on both the planaria and the tadpoles by decreasing the rate of regrowth. After seven days of measuring the length of the planaria and the tadpoles, our data suggests that polymyxin B does reduce the rate of regrowth in planaria and tadpoles. There is not a significant difference between polymyxin B and spring water, but the planaria and tadpoles that were present in spring water regrew at a faster rate compared to the planaria and tadpoles in polymyxin B. polymyxin B could have been affected the neoblasts or the blastema in planaria and the undifferentiated mesenchyme-like cells in the tadpoles therefore reducing the rate of regrowth. Based on our results, it seems that polymyxin B has an effect on the rate of regrowth. There is not a lot of information regarding polymyxin B as a teratogen. Therefore, more experiments must be done in order to determine if polymyxin B does have a teratogenic effect on organisms.

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