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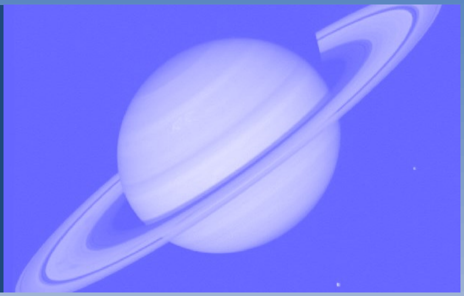

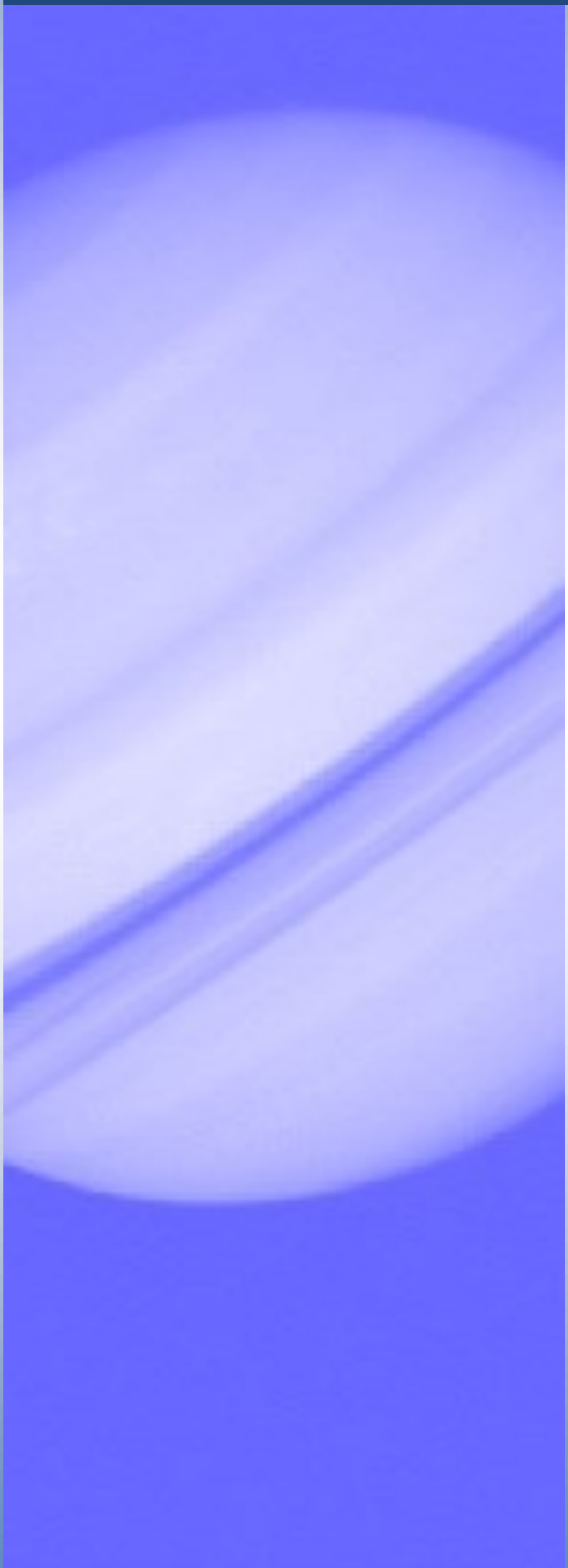

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Editorial

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 5 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 the sixth issue of the *SATURN Journal* we presented additional articles from the microbiology course at SCCC that compares soil bacterial communities on Long Island. We also presented 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 presented two articles from students at Molloy College that test the effects of teratogens on *Planeria*.

In this seventh issue of the *SATURN Journal* we present an additional article from a microbiology course at SCCC that compares soil bacterial communities on Long Island. We also present multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC, and an article that compares soil composition from a Chemistry course.

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*

Oak Trees are Dominant on the North Shore while Pine Trees are Dominant on the South Shore and White Pine is found on Both Shores of Long Island New York

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Key Words: Oak, Pine, North, South, Shore

Abstract:
A total of 260 tree samples from three different properties were collected. The species of trees were identified and confirmed using 2 dichotomous keys. Two of the properties (residential) were located in Smithtown on the North Shore while the other was located in Bay Shore (Gardners Bay Park) on the South Shore of Suffolk County. The tree species found were Scarlet Oak (*Quercus coccinea*), Pine (Pin) Oak (*Quercus palustris*), Pin Cherry (*Prunus pensylvanica*), Water Birch (*Bertula nigra*), American Beech (*Fagus grandifolia*), Sycamore (*Platanus occidentalis*), and White Pine (*Pinus strobus*). They were divided into two categories, North Shore trees and South Shore trees of Long Island.The dominant species in the North Shore were oaks and the dominant species on the South shore were pines while the only species found on both North and South shores of Long Island was White Pine (*Pinus strobus*).

Introduction:
There are different species of trees throughout Long Island. On the North Shore, many trees like the Sugar Maple Tree *(Acer saccharum),* White Oak Tree *(Quercus alba),* and Flowering Dogwood Tree *(Cornus florida)* are found (Leccese, 2016). On the South Shore, many trees like the Red Maple Tree *(Acer rubrum)*, and Red Oak Tree *(Quercus rubra)*are most commonly found (Leccese, 2016). According to the Arbor Day Foundation (2016), the White Pine (*Pinus strobus*) grows in acidic, moist, well-drained and dry soils. While it does best in moist soil, the tree can has been known to tolerate everything from dry, rocky ridges to bogs. The North Shore of the island is hillier and tends to have more acidic rock clay while on the South Shore it is relatively flat and sandier. According to the Arbor Day Foundation (2016), the North Shore is at higher elevation than the South Shore. This particular species of pine tree can tolerate many different types of soil conditions (moist or well drained), sun or no sun exposure, wide range of weather conditions.

Methods:
Three students collected data for this experiment. Latitude, longitude and sea level were found for each location using *latlong.usgs.gov* and *earthexplorer.com*. For the locations in the North Shore, starting at one specific point on the property and the trees within a 91.44m radius, three different species were identified with a total of 109 trees counted. From a different Smithtown property, three more species were identified with a total of 19 trees counted. For the location on the South Shore samples, a specific point on the property along with a 91.44 radius around the point was marked. Within this radius a total of 130 trees were counted; only three different species of trees were identified from the 130 counted in the South shore. The Tree Finder: A Manual for the Identification of Trees by Their Leaves (Watts 1991) was used for the identification of the leaves collected. A mobile phone app (leafsnap.com*)* was also used to aid in the identification. The trees on the North Shore and the trees on the South Shore were compared. In both the North and South shores, the White Pine (*Pinus strobus*) was on the three properties we observed. The North Shore properties Smithtown 1 measured a 91.44m x 91.44m and

Smithtown 2 measured 91.44m x 91.44m. The South Shore property measured a 91.44m radius of park land. The distance between Smithtown and Bay Shore is approximately 28k apart.

Results:

It was determined that the Oak species, Scarlet Oak (*Quercus coccinea*) at 87% of findings and Pin Oak (*Quercus palustris*) at 66.7% findings were the dominant species on the North Shore. The White Pine (*Pinus strobus*) was found on both the North Shore (30% findings) and the South Shore (66.9% findings) of Long Island, NY. One of the trees collected is not a native tree on Long Island, NY; Pin Cherry (*Prunus pensylvanica*) (Arbor Day Foundation 2016). By comparing the similarities between the trees in the North and South shore, White Pine (*Pine strobus*) was found in Smithtown (Table 2 & Table 3) and Bay Shore (Table 4) and survives on each of the shores of Suffolk County.

Table 1: Property locations used for sample collection

Property 1: Smithtown	Property 2: Smithtown	Property 3: Bay Shore
Latitude: 43.702973 Longitude: -70.265252	Latitude: 40.857929 Longitude: -73. 193861	Latitude: 40.7019566 Longitude: -73.2742730
Elevation: 102.718m	Elevation: 32.614m	Elevation: 2.743m

Table 1 provides information pertaining to the three locations by which the tree samples were collected, identified, and compared in order to conduct this experiment.

Table 2: Identification of samples found on Residential Property 1: Smithtown

Common Name	Scientific Name	Quantity on Property	Indigenous or not	Percent
Scarlet Oak	*Quercus coccinea*	95	Yes	87
Pin Cherry	*Prunus pensylvanica*	2	No	1.8
White Pine	*Pinus strobus*	12	Yes	11

Table 3: Identification of samples found on Residential Property 2: Smithtown

Common Name	Scientific Name	Quantity on Property	Indigenous or not	Percent
Pine (Pin) Oak	*Quercus palustris*	14	Yes	66.7
Water Birch	*Bertula nigra*	3	Yes	14.3
White Pine	*Pinus strobus*	4	Yes	19

Table 2 and Table 3 provide information gathered on two different residential properties in Smithtown, the scientific name of each of the tree species found, the quantity of samples collected of each tree species, the percent of each found, and whether or not the trees collected were native to North Shore of Long Island.

Table 4: Identification of samples found on Park Property 3: Bay Shore

Common Name	Scientific Name	Quantity on Property	Indigenous or not	Percent
American Beech	*Fagus grandifolia*	28	Yes	21.5
Sycamore	*Platanus occidentalis*	15	Yes	11.5
White Pine	*Pinus strobus*	87	Yes	66.9

Table 4 provides information gathered on one park property in Bay Shore, specific names of each tree species found, the quantity of samples collected for each tree, percent of each found, and whether or not the trees collected were native to South Shore of Long Island.

According to the results (Table 2, Table 3, & Table 4), it was found that out of the 260 samples of trees, the Scarlet Oak (*Quercus coccinea*) and Pin Oak (*Quercus palustris*), are found to be dominant species on the North Shore. One species, White Pine (*Pinus strobus*) was found on both the North Shore and the South Shore of Long Island. Only one species, Pin Cherry (*Prunus pensylvanica*) of the 260 samples is not native to Long Island.

Discussion: According to The Arbor Day Foundation (2016), out of the nine identified tree species in this study, eight of them are indigenous to Long Island, while only one the Pin Cherry is found to be non-native to North America. The Scarlet Oak (*Quercus coccinea*) is indigenous to Long Island and has a high tolerance for poor soil and it is versatile with most soil types except for that that is alkaline. It is drought resistant. Pin Oak (*Quercus palustris*) is indigenous as well and grows in acidic, loamy, moist, rich, sandy, well-drained, wet and clay soils. It as well does not grow in alkaline soils. Pin Cherry (*Prunus pensylvanica*) is not indigenous to Long Island and it grows in infertile rocky soil, sandy plains and moist loamy soils. Water Birch (*Bertula nigra*) grows well in acidic, loamy, moist, sandy, well-drained, wet and clay soils, but does not grow well in alkaline soils. It will tolerate moderate flooding as well as some drought. The American Beech (*Fagus grandifolia*) grows in acidic, loamy, moist, sandy, silty loam, well-drained and clay soils. It is very drought sensitive. Sycamore (*Platanus occidentalis*) trees are often found in areas where there is a lot of moisture and they are not drought resistance. They do well in salty soil and can withstand high winds. This explains why White Oak is prominent in the North Shore. They do better is acidic clay like soils that are well drained, while trees like sycamores that need moisture on a daily basis and do not deal well with drought would be present at the almost sea level South Shore where their need for high moisture soil is met. The White Oak, in this study, was consistent throughout the island meaning that the tree must be very versatile and can withstand a variety of environments. The information regarding whether a tree was Scarlet Oak (*Quercus coccinea*) and Pin Oak (*Quercus palustris*) and White Pine (*Pinus strobus*) indigenous or not as well as growing conditions needed for the trees was collected from the Arbor Day Foundation (2016).

When comparing our results with that of other tree studies the Scarlet Oak (*Quercus coccinea*) and Pin Oak (*Quercus palustris*) was found to be dominant in the North Shore as well, and White Pine (*Pine strobus*) and Sycamore (*Platanus occidentalis*) was found present in the South Shore (Glynn et al. 2013*)*. In a different study, Pin Oak (*Quercus palustris*) was found in both the North Shore and the South Shore (Bonavia et al. 2013).

Conclusion: Among the 260 tree samples identified, 109 Oaks were counted making them dominant species on the North Shore. White Pine (*Pinus strobus*) is the dominant species on the South Shore having 87 in total counted, but it is also found on the North Shore with a count of 16.

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Non-native Trees and Maples are Prevalent in the towns of Commack, Bay Shore and Lindenhurst

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Keywords: Bay Shore, Commack, Trees, Native, Nonnative

Abstract:

Students did tree surveys on their residential properties, and with the help of dichotomous keys and applications, they were able to identify the tree species that are on those properties. The students collected 41 samples, and were able to use two different dichotomous keys and computer applications to identify the species. They discovered that 26% of the trees were not native species to Long Island. It was also discovered that around 30% of the trees gathered were different variations of Maples *(Acer).*

Introduction:

There are many factors that affect the environment and the species including the sea level, population and more. According to *The Weather Channel* (2016), in Commack the average precipitation is 3.9 inches (9.9cm) and the average high temperature is 60º (15.6ºC). In Bay Shore the average precipitation is 3.8 inches (9.7cm) and the average high temperature is 60º (15.6ºC). In Lindenhurst the average precipitation is 3.5 inches (8.89 cm) and the average high temperature is 61ºF (16.1ºC). The height above sea level in Commack is 131 feet (40 meters), Bay Shore is 16 feet (5 meters), and Lindenhurst is 43 feet (13 meters). Populations in each town vary, in Commack the population is 35,487, in Bay Shore it is 28,883, and in Lindenhurst the population is 27,277 (*The Weather Channel* 2016). The dichotomous keys allow us to identify a tree species by its characteristics, it also helps determine if the tree is native or non-native to its region.

Method:

Students gathered a sample from each tree from four residential properties in Bay Shore, Lindenhurst and Commack, resulting in 41 samples altogether. They were able to identify the different types of tree species and origins of the species using smartphone applications such as US Trees (Duyster, 2016) and dichotomous keys (Watts 1991, Petrides and Wehr 1998).

Results:

Trees found in Bayshore at 40.754595, -73.242296 were American Holly (*Ilex opaca)* native to North East America, Chinese Elm (*Ulmus parvifolia)* native to Eastern Asia, two Sugar Maples (*Acer saccharum)* native to Eastern Canada, Paper Birch *(Betula papyrifera)* native to Northern America, Eastern White Pine (*Pinus strobus)* native to Eastern North America, Yellowwood *(Cladrastis kentukea)* native to Southeastern United States, Butternut Tree *(Juglans cinerea)* native to Eastern North America, Northern Catalpa *(Catalpa speciosa)* native to Midwestern United States, Northern Whitecedar *(Thuja occidentalis)* native to Eastern Canada/ Northern America, and Blue Ash *(Fraxinus quadrangulata)* native to Northwest America.

Trees found in Cormack at 40.856359, -73.173804 were two Red Maples *(Acer rubrum)* native to Eastern North America, Flowering Dogwood *(Cornus florida)* native to Eastern North America, Osage Orange *(Maclura pomifera)* native to Southern North America, Weeping Blue Atlas Cedar

(Cedrus atlantica) native to Northern Africa, White Spruce *(Picea glauca)* native to North America, and a European Mountain Ash *(Sorbus ascuparia)* native to Europe.

Trees found in Lindenhurst at 40.741895, -73.989308 were European Larch *(Larix decidua)* native to Central Europe, two Weeping Cherries *(Prunus subvertella)* native to Himalayas, Black Ash *(Fraxinus nigra)* native to Northeast America, five Hardy Catalpa *(Catalpa speciosa)* native to Midwestern United States, and a Sugar Maple *(Acer saccharum)* native to Eastern Canada.

Trees found in Bayshore at 40.758050, -73.255859 were three Vine Maples *(Acer cicinatum)* native to Western North America, three Silver Maples *(Acer Saccharinum)* native to Eastern North America, two Common Dogwoods *(Acer Sanguinea)* native to Europe/ Western Asia, and two Pitch Pines *(Pinus rigida)* native to Eastern North America.

Altogether 15 trees were native, 26 were non-native. 63% of the trees were non-native in these areas, 37% were native, and 27% were Maples.

Table 1: Trees found in Bay Shore
Location: 40.754595, -73.242296

Type of Tree	**Scientific Name**	**Native Location**
American Holly	*Ilex opaca*	North East America
Chinese Elm	*Ulmus parvifolia*	Eastern Asia
Sugar Maple	*Acer saccharum*	Eastern Canada
Sugar Maple	*Acer saccharum*	Eastern Canada
Paper Birch	*Betula papyrifera*	Northern America
Eastern White Pine	*Pinus strobus*	Eastern North America
Yellowwood	*Cladrastis kentukea*	Southeastern United States
Butternut Tree	*Juglans cinerea*	Eastern North America
Northern Catalpa	*Catalpa speciosa*	Midwestern United States
Northern White Cedar	*Thuja occidentalis*	Eastern Canada/ Northern America
Blue Ash	*Fraxinus quadrangulata*	Northwest America

Table 2: Trees found in Commack
Location: 40.856359, -73.173804

Type of Tree	**Scientific Name**	**Native Location**
Red Maple	*Acer rubrum*	Eastern North America
Flowering Dogwood	*Cornus florida*	Eastern North America
Osage Orange	*Maclura pomifera*	Southern North America

Weeping Blue Atlas Cedar	*Cedrus atlantica*	Northern Africa
Red Maple	*Acer rubrum*	Eastern North America
White Spruce	*Picea glauca*	North America
European Mountain Ash	*Sorbus aucuparia*	Europe
Sweet Buckeye	*Aesculus flava*	Midwestern United States
Blue Ash	*Fraxinus quadrangulata*	Northwest America
Sweet Buckeye	*Aesculus flava*	Midwestern United States

Table 3: Trees found in Lindenhurst
Location: 40.741895, -73.989308

Type of Tree	**Scientific Name**	**Native Location**
European Larch	*Larix decidua*	Central Europe
Weeping Cherry	*Prunus subhirtella*	Himalayas
Weeping Cherry	*Prunus subhirtella*	Himalayas
Black Ash	*Fraxinus nigra*	Northeast America
Hardy Catalpa	*Catalpa speciosa*	Midwestern United States
Sugar Maple	*Acer saccharum*	Eastern Canada
Hardy Catalpa	*Catalpa speciosa*	Midwestern United States
Hardy Catalpa	*Catalpa speciosa*	Midwestern United States
Hardy Catalpa	*Catalpa speciosa*	Midwestern United States
Hardy Catalpa	*Catalpa speciosa*	Midwestern United States

Table 4: Tree’s found in Bay Shore
Location: 40.758050, -73.255859

Type of Tree	**Scientific Name**	**Native Location**
Vine Maple	*Acer cicinatum*	Western North America
Vine Maple	*Acer cicinatum*	Western North America
Silver Maple	*Acer saccharinum*	Eastern North America

Common Dogwood	*Cornus sanguinea*	Europe/ Western Asia
Silver Maple	*Acer saccharinum*	Eastern North America
Vine Maple	*Acer cicinatum*	Western North America
Pitch Pine	*Pinus rigida*	Eastern North America
Pitch Pine	*Pinus rigida*	Eastern North America
Common Dogwood	*Acer sanguinea*	Europe/ Western Asia
Silver Maple	*Acer saccharinum*	Eastern North America

Discussion:

In this study, the most popular genus recorded was *Acer,* with 12 samples. At least one *Acer* specimen was found in each neighborhood, which included Lindenhurst, Bayshore, and Commack. Interestingly, several species of *Acer* were identified in this survey, such as *Acer cicinatum, A. saccharinum, A. sanguinea, and A. rubrum*. Brown and Cosar (2016) also identified the genus *Acer* in both Commack and Bayshore with six and ten trees, respectively. Molloy et al. (2016) noted the genus *Acer* in the town of Commack with a total of four trees. *Acer* was also found in Huntington Station according to Matarazzo and Italiano (2016) and Port Jefferson according to Mirabito et al. (2016). This suggests that the genus *Acer* is a dominant genus of tree on Long Island. Also found in this study was the prevalence of nonnative tree species on the residential properties in the towns of Bay Shore, Commack and Lindenhurst.

Conclusion:

The investigators were able to use a dichotomous key to accurately classify forty one different samples of trees from across Long Island. Upon collecting and identifying all 41 tree samples from the towns of Lindenhurst, Bay Shore and Commack, it was found that 63% of the tree samples were not native to Long Island. The other 37% of trees gathered being native to Long Island. Altogether, 15 of the tree samples collected were not native, while 26 were not native. It was also discovered that 27% of the species gathered were different variations of maple trees. These findings indicate that maple trees are the prevalent species of trees found in the towns of Commack, Bay Shore and Lindenhurst.

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Characterization and Determination of Soil Bacterial Populations from Long Island Shores

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Keywords: Soil, Bacteria, Bacilli

Abstract:
The purpose of this study was to identify and characterize the existing bacterial populations from two predetermined, defined locations; from the north and south shores of eastern and western Long Island, N.Y. Serial dilution and gram staining were carried out in order to differentiate cell colonies, and to identify colony and cell morphology. MacConkey and TSA nutrient agar plates were used for the procedures. Protein gel electrophoresis was performed on selected colonies from both samples. Bacilli was commonly observed in the samples collected from both locations.

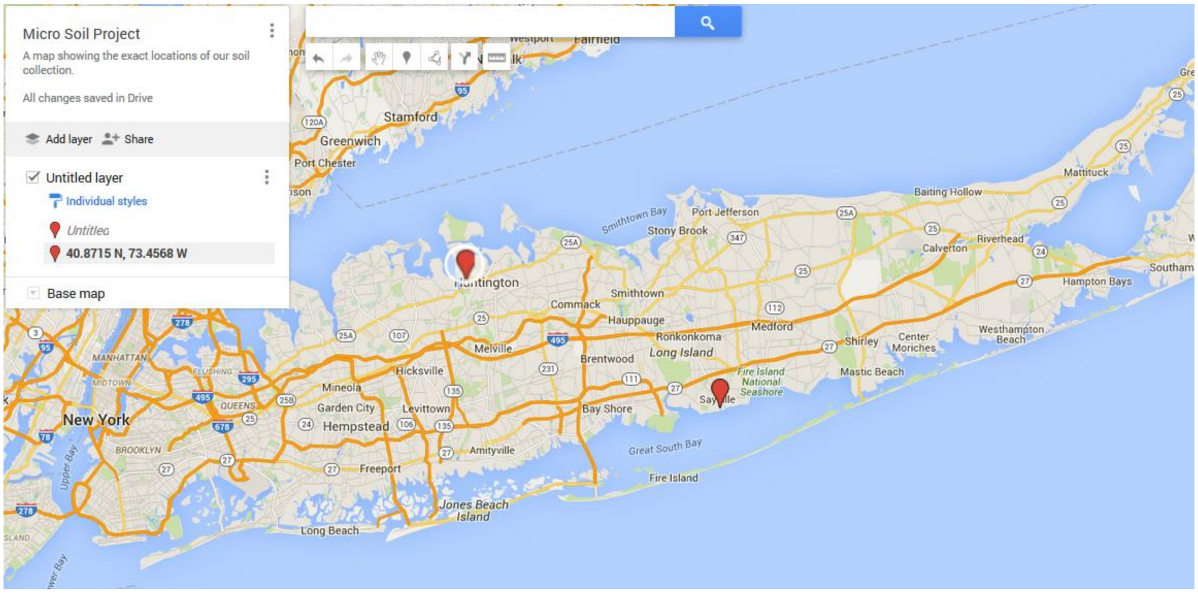
Introduction:
Soil ecosystems are highly complex and contain many bacterial and fungal species (Abid 2015). Bacteria serve a number of critical and necessary functions, including important roles in the nitrogen and carbon cycles. However, they can also have detrimental effects to eukaryotic organisms, often exhibiting the ability to inhabit numerous kinds of species.

Soils are highly diverse. It has been estimated that 1 g of soil contains up to 1 billion bacteria cells consisting of tens of thousands of taxa (Wagg 2014).

It's clear that microorganisms dominate the earth, with a large majority of its population comprised of bacteria. In terms of organisms, soil in particular is largely composed of bacteria, and due to the variety of types of soil, it's no surprise the numerous species of bacteria that inhabit it.
Microorganisms, perhaps the most adaptable of all organisms, are physiologically active at temperatures from -5°C to 105°C and possibly 250°C, and at pressures ranging from <1 to 40 atmospheres (McArthur 1988)
Bacteria are extremely durable and resilient as well, capable of surviving in impossibly harsh environments. This ubiquitous nature translates to nearly any medium; whether it's freshwater, saltwater, or terrestrial environments, bacteria are abundant. This experiment served to test this idea through the use of soil collection from the north and south shores of Long Island, in order to identify, analyze, and compare the bacterial populations.

Methods:
Firstly, soil samples were taken from two locations; a sample from the north shore of Long Island and one from the south shore. A map of the specific locations (Fig 1), and an exhibition of the exact coordinates of collection (Table 1), along with the lab members who worked on each sample is displayed. The samples were designated numbers according to the order of lab partners in the lab area, and were chosen by our instructor. The lab teams have also been designated numbers, for the ease of future reference. The coordinates are stated in decimal degrees.

Figure 1.



<u>Table 1.</u> Locations and Team Members.

Lab Members	Team #	Coordinates	Location	Designated Sample #
Felix Hernandez, Bernard Essuman	1	40.8715 N, 73.4568 W	Sayville	3
Yanuby Barragan-Illidge, Sehar Asim	2	40.7258 N, 73.0777 W	Cold Spring Harbor	4

Two nutrient agar plates were distributed to each pair of lab partners, and once the soil was obtained, both plates were given to our instructor for proper incubation. Our instructor then prepared a flask filled with water mixed with our soil, in order to perform the serial dilutions. The samples were diluted in four labeled multiples of 10, starting with 1:10, and increasing to 1:100, 1:1000, and finally 1:10,000 ratios. At each stage of dilution a MacConkey Agar plate was inoculated, followed by inoculation onto a TSA plate (tryptic soy agar). This procedure was done by both teams, and all plates were incubated at 30°C for twenty-four hours.

Next, the plates were examined, with particular interest in the colony morphology. Additional dilutions and inoculations were performed due to the overcrowded colonies observed in the TSA plates. Lastly, Gram staining was performed on distinct, unique colonies found on the TSA plates.

Results:
The plates, colonies, and corresponding Gram staining photos are shown below:

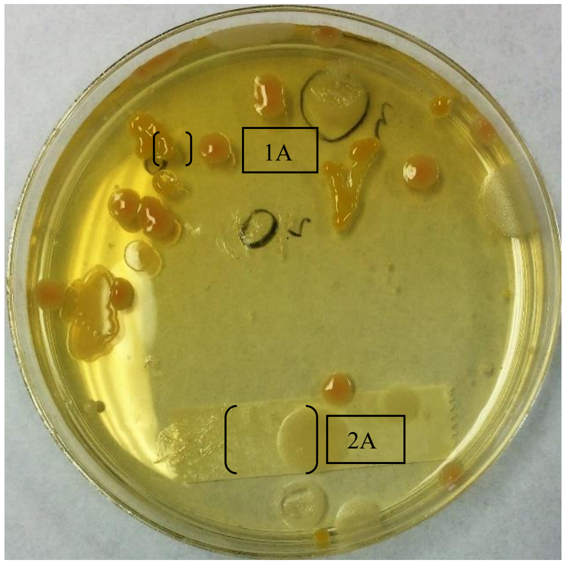


Figure 2.

Cold Spring Harbor Sample 1. (1:1,000)

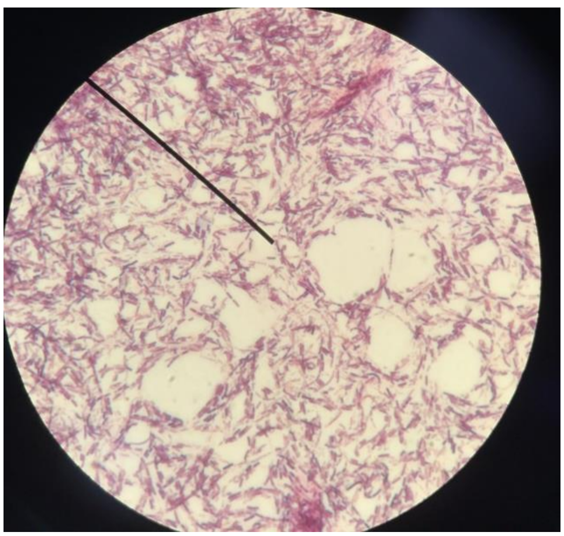


Figure 2a.

Cold Spring Harbor Sample 1,

Colony 1a, Gram staining.

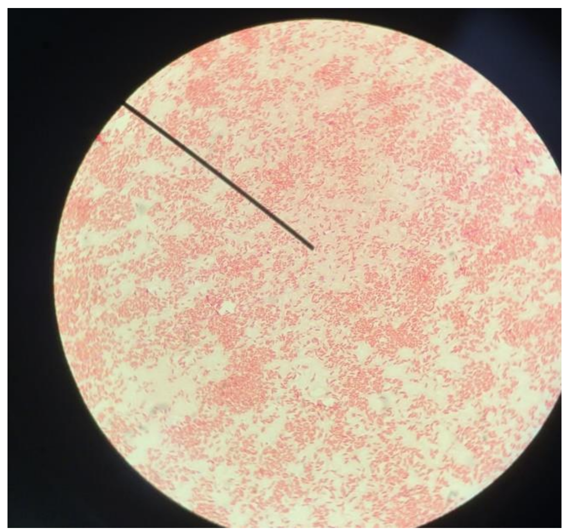


Figure 2b.

Cold Spring Harbor Sample 1,

Colony 2a, Gram staining.

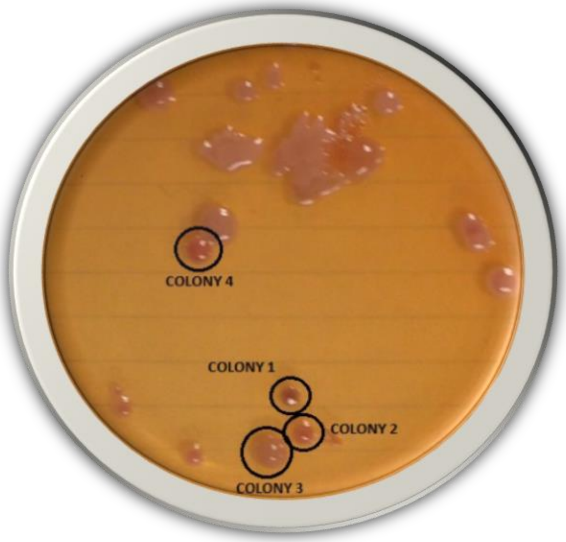


Figure 3.

Sayville Sample 1. (1:10,000)

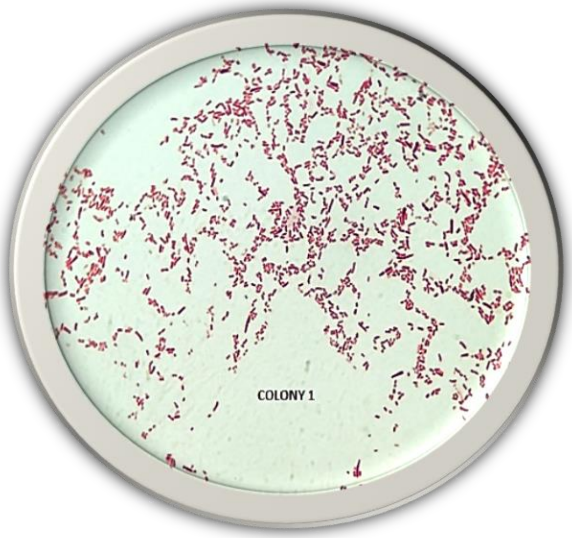


Figure 3a.

Sayville Sample 1,

Colony 1, Gram staining.

Figure 3b.

Sayville Sample 1,

Colony 2, Gram staining.

Figure 3c.

Sayville Sample 1,

Colony 3, Gram staining.

Figure 3d.

Sayville Sample 1,

Colony 4, Gram staining.

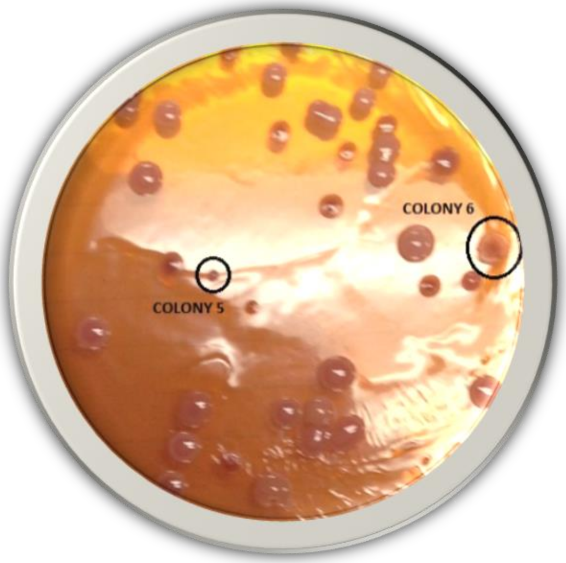


Figure 4.

Sayville Sample 2. (1:1,000)

Figure 4a.

Sayville Sample 2,

Colony 5, Gram staining.

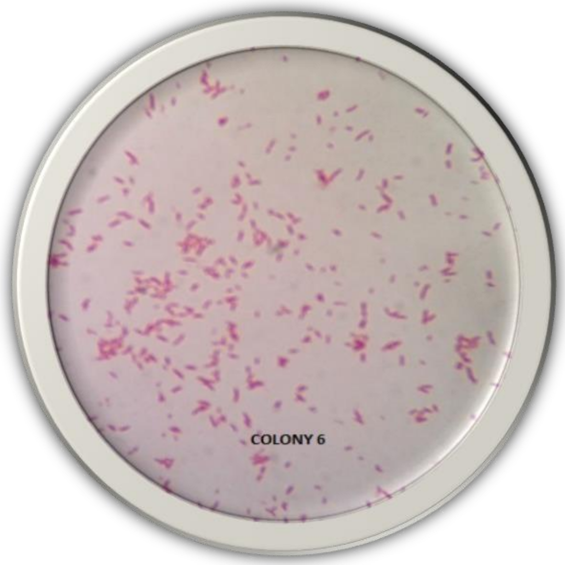


Figure 4b.

Sayville Sample 2,

Colony 6, Gram staining.

Sample 1 from Cold Spring Harbor (Figure 2) was inoculated to a MacConkey agar plate, from the 1:1,000 serial dilution. Additionally, it showed two unique colonies. The first colony was round, light pink, opaque, convex, and small. When Gram stained it exhibited Gram-positive streptobacilli in extremely close proximity to each other. The second colony was round, light grey, translucent, flat, and large. When Gram stained it exhibited Gram-negative bacilli, in extremely close proximity to each other.

Sample 1 from Sayville (Figure 3) was inoculated to a MacConkey agar plate, from the 1:10,000 serial dilution. It showed four unique colonies. The first colony was round, dark purple, convex, shiny and small. Under closer inspection it showed Gram negative bacilli in close proximity to each other. Colonies 2-4 from Sample 1 also exhibited Gram negative bacilli, with round, convex, pink, and shiny colonies. Colonies 3 and 4 were larger than the rest, while Colony 4 was attached to a larger, purple colony.

Sample 2 from Sayville (Figure 4) was inoculated to a MacConkey agar plate, from the 1:1,000 serial dilution. It showed 2 unique colonies. The first colony (Colony 5) was purple, shiny, convex, tiny, and exhibited Gram negative bacilli. Conversely, the second colony (Colony 6) was filamentous, dry, light pink, had irregular margins, and uneven elevation. However, when Gram stained it also displayed Gram negative bacilli.

Discussion:

Due to the additional dilutions and inoculations, many of the plates initially inoculated were not viable. The samples from Cold Spring Harbor were handled by Team 2, and initially only one plate had sufficient amounts of bacterial growth. However, when inoculated to the TSA plates they showed numerous, crowded colonies. The ideal environment for collecting bacteria to make stains is enough to ensure bacterial diversity, and an overcrowded plate is detrimental towards this goal. Overcrowded plates were a problem for both teams, thus we both were forced to use the colonies from the MacConkey agar plates. When the plates were examined and we saw the immense number of colonies in close proximity, we believed the problem stemmed from the serial dilutions. Further dilutions to a ratio of 1:100,000 could've yielded fruitful results, and with help from our instructor both teams diluted to the aforementioned ratio and inoculated to a second set of MacConkey agar plates. We intended to transfer the selected colonies to TSA plates, but due to time constraints we were unable to.

Numerous mistakes were made throughout the experiment; these discrepancies must be noted, as not all possible data was collected. The natural flora of the locations from where we obtained our soil should have been noted as well, additional research could have been done identifying the relationships, if any, of the plants in the area with the microbes in the soil. The differences between the bacteria from the two shores was minimal at best, with Gram negative bacilli commonly observed from both samples. Further testing could be done with a wider sample range, with obtaining soil from multiple shores with more serial dilutions.

Conclusion:

Our experiment led us to understand and appreciate to a greater degree the relevance of bacteria. Their classification and differentiation is especially important, as in the case of Gram staining. This procedure is extremely useful in identifying various genus and species of bacteria. Other methods can be useful as well, such as gel electrophoresis to analyze the unique protein or DNA "fingerprint" of different species of bacteria. Environmental bacteria have been revealed to be a reservoir of antibiotic resistance genes and a potential pool of novel resistance genes in clinical pathogens (Abid 2015). Soil especially has a vast variety of bacteria with great scientific and clinical significance. The study of soil bacteria is thus very important, along with the procedures used to study them. Developing new techniques, while using and improving current methods is critical to better understand the organisms that have numerous major impacts to the environment, our normal flora, and even the continued survival of countless life forms.

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Inorganic Compound Determination and Composition Analysis of Long Island Soils

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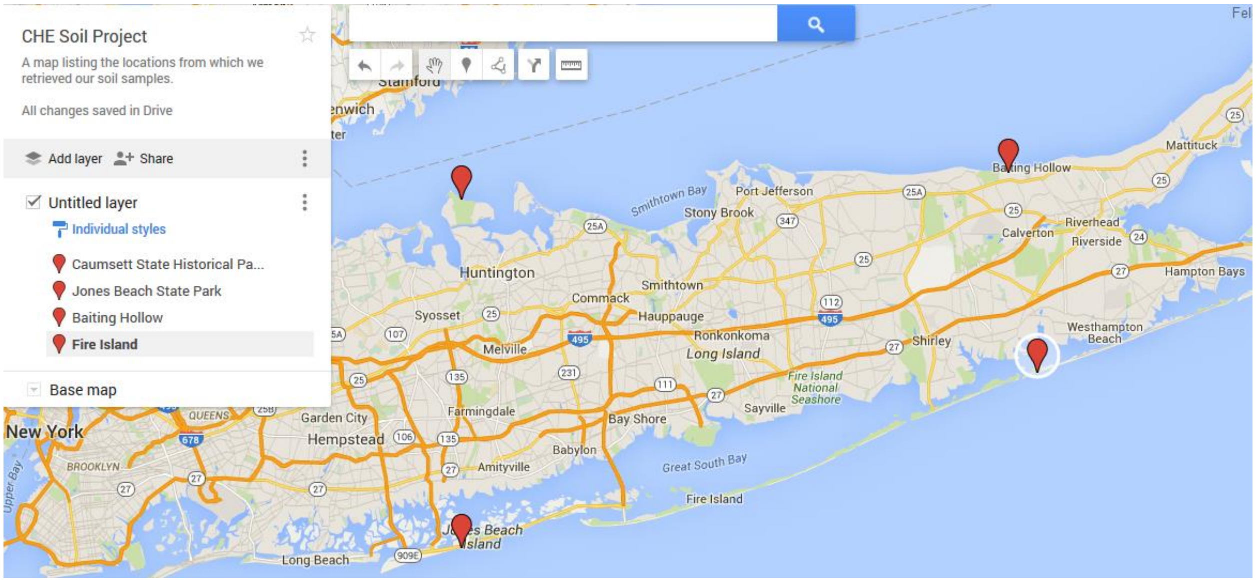
Keywords: Soil, Sample, Inorganic, Health, Compound, Location

Abstract:
The purpose of this study was to identify the soil texture, moisture content, soil pH, and selected minerals and nutrients of four different soil samples. The samples were collected from four predetermined, geographically related locations: Jones Beach, Caumsett State Historical Park, Baiting Hollow, and Fire Island. Soil texture was measured, followed by the use of an NPK kit, with the pH tested using a pH meter. Soil moisture was also measured with a soil moisture sensor. All samples proved to have varying concentrations of the inorganic compounds, high sand content, with low clay and loam content. A Soil Textural Triangle was also used to properly classify our soil examples.

Introduction:
Soil health is an integral aspect of any terrestrial ecosystem, thus it's of paramount importance to those involved in geology, pedology, agriculture, or gardening. For these reasons, it's overwhelmingly necessary to ensure its health, and prevent any detrimental actions to the ecosystem. Namely, the pH, moisture, texture, and composition are important factors to consider when measuring the health of soil, and are thus important to understand and properly maintain.
The Earth's surface is dominated by the elements O, H, Si, Al, Fe, Ca, Na, K, Mg, Ti, and P. As oxides, these elements account for ≈ 96% of the total mass of the continental crust (1). Many of the remaining elements in the periodic table (together with C) are essential for life. (Traina, 2007).
While all elements have practical uses, some are especially important in gauging the soil's capacity to support life; this factor is directly correlated to the soil's overall health. In particular, nitrogen (in the form of nitrate), phosphorus, and potassium are nutrients that play critical roles for plant growth. Other elements are only necessary in trace amounts, and are designated with the term "minerals". The pH mustn't be overly acidic or basic, and the soil must have large enough pores to adequately retain water (Nebraska, 1999). Due to the numerous categories and subcategories of soil, all of the aforementioned characteristics are completely dependent on the type of soil at hand; one configuration of texture, moisture, and composition might not be suitable for a different species of soil. Plants themselves are extremely complex as well, and some require drastically different conditions. All of these features culminate to the highly complex science of soil health, which has a direct impact on plant growth, and ultimately, human sustainability on earth.

Methods:
Firstly, NPK test kits and two thirty mL jars were distributed to each lab group by the professor, with instructions on how to conduct the experiments explained thereafter. Four locations were then selected, with a particular emphasis on beaches. Below is a screenshot of a map with a pin marking each location of the samples collected.

Figure 1.



The goal was to collect samples from the eastern and western portions of Long Island, along the north and south shores. Ideally, the line of longitude for each sample in either section would be the same, however logistically this couldn't be done, due to bodies of water, roads, or buildings obstructing the precise location. The coordinates were recorded using a digital compass, using the exact position from where we obtained the sample. Exhibition of the coordinates is shown (Table 1) in the standard units of most global positioning systems, DMS, or, degrees, minutes, and seconds, including the pins' positions on the map.

Table 1. Locations of Soil Samples

Location	DMS	Position on Map
Caumsett State Historical Park	40° 56′ 20.6″ N 73° 28′ 16.9″ W	Upper left
Jones Beach State Park	40° 36′ 02.5″ N 73° 28′ 17.0″ W	Lower left
Baiting Hollow	40° 57′ 56.0″ N 72° 46′ 10.8″ W	Upper right
Fire Island	40° 46′ 17″ N 72° 43′ 56″ W	Lower right

Any vegetation around the exact positions was photographed, with some being collected as well. After the samples were retrieved, they were sifted, with any rocks and inorganic matter transferred to a separate bag. The same was done for the vegetation collected.

Next, we began testing the soil texture specifically the percentage of sand, silt, and clay. Four additional seventy-five mL jars were obtained to increase visibility for the soil composition (texture) and were used instead of the two jars initially distributed. The procedure was completed using the methods explained by our instructor and allowed to settle for at least twenty-four hours.

We then tested for the selected inorganic elements, which included phosphorus, potassium, and nitrogen using the NPK test kit provided to us by our instructor. Finally, we tested the pH and moisture using the appropriate equipment, also along with the aid and direction of our instructor. Once the soil samples settled, photos were taken and the layers were measured in millimeters using a standard metric ruler, then converted to percentages.

Results:
Results indicating the structural and chemical compositions of the various soil samples have been compiled and separated to better organize the data.

Table 2. Structural Composition

Area	Sand (%)	Silt (%)	Clay (%)	Classification
Caumsett State Historical Park	100.0000	0	0	Sand
Jones Beach State Park	42.3077	53.8462	3.8462	Silty loam
Baiting Hollow	81.4815	11.1111	7.4074	Loamy sand
Fire Island	80.0000	14.2857	5.7143	Loamy sand

Table 3. Chemical Composition

Area	pH	Moisture	Nitrogen Content	Phosphorus Content	Potassium Content
Caumsett State Historical Park	5.6	7.7	Low	Low	High
Jones Beach State Park	6.2	5.2	Low	Low	High
Baiting Hollow	6.3	2.3	Low	Medium	High
Fire Island	6.5	2.1	Low	Low	Medium

The results indicates that the samples had varying levels of concentration of the selected compounds. The soil sample from Caumsett State Historical Park had no discernable layers of silt or clay (Table 2), with the entire sample being composed of sand.
The sample from Jones Beach State Park had nearly equal levels of sand and silt with a low level of clay. The samples from Baiting Hollow and Fire Island were primarily composed of sand and silt, but with higher percentages of clay then the two previous samples. Thus, using the Soil Textural Triangle we were able to classify our samples based on their texture (Nebraska, 1999). Our sample from Caumsett State Historical State Park was primarily sand, the samples from Jones Beach States Park was silty loam, while the sample from Baiting Hollow was loamy sand, with the sample from Fire Island classified as loamy sand as well.
The pH levels were slightly more acidic, while two of the samples were relatively high in moisture, while the other two were relatively low (Table 3). The nitrogen, phosphorus, and potassium content varied between samples; however, the nitrogen content was low for all of the samples, while the potassium content was medium or high for all of the samples. The phosphorus content was low to medium, with most of the samples low in content.

Discussion:
The results obtained were somewhat expected, since we retrieved the soil from our beaches we didn’t expect high concentrations of the inorganic compounds. The plant life at the selected locations wasn’t extensive, as the soil was mostly comprised of sand, which is a difficult medium for most plants to grow in. Only the hardiest of species can grow in sand, such as beach-grass and certain trees, such as eastern red cedar and pitch pine (Energy, 2016).

The soil texture was expected also, as the samples were primarily composed of sand. Our experiment had one extreme sample, from Caumsett State Historical Park. This sample was completely comprised of sand, after it was allowed to settle there wasn't a visible layer of silt or clay. The proximity to the Long Island Sound in the north or the Atlantic Ocean in the south is a possible answer as to why there wasn't any silt or clay, but the other samples were also collected within a close distance to the water. There were also discrepancies with the samples' moisture levels, as the samples collected from the eastern area of the island had relatively lower levels of moisture. Further testing must be done to accurately determine the effects, if any, that the bodies of water and their cardinal position have on the surrounding soil. The pH was in the expected range, typically ideal soil pH is between 5.8 and 6.5 (Agro 2016).

Surprisingly, the samples were classified as having at least some portion composed of loamy soil. Our initial hypothesis was to expect low concentrations of nitrogen, phosphorus, and potassium, along with soil entirely comprised of sand. However, the inorganic compound levels varied greatly among the samples and only one was composed of only sand. Interestingly, the soil collected from Caumsett State Historical Park was surrounded by the most flora, indicating either the presence of multiple kinds of soil in the area or an abundance of plant species capable of thriving in sand. The goal wasn't to collect samples from dunes, but the surrounding area near the beaches. We still aimed to be as close as possible, but in the case of the sample from Fire Island, it was necessary to adjust our soil collection plan.

Hurricane Sandy was a Category 2 hurricane that was directly responsible for at least 147 deaths (CNN 2015). The damage inflicted to islands is well known; large removals of sand, creation of new inlets, and massive destruction to any residential homes or businesses along the shore is common. However, Hurricane Sandy was an extremely powerful storm, creating numerous new inlets all over the south shore (St. Petersburg 2015). A before and after image of Fire Island is shown (Fig 2), exhibiting an inlet created by the hurricane.

Figure 2.

One of our coordinates was on the other side of the newly created inlet, but as this change in the topography hadn't been included in our GPS, we unknowingly drove to a location which had no logistical means of reaching. It's for this reason that the longitude for our sample from Fire Island differs slightly from our sample from Baiting Hollow (Table 1). This discrepancy must also be accounted for, as it wasn't intentional. The effects of the storm must also be accounted for as well, since numerous regions on Long Island had their soil displaced or even absorbed by the ocean or Sound.

Conclusion:

Soil health has always been of great economic, and scientific importance. It's the original source of our food, and if not properly maintained, would spell the deaths of billions of organisms on Earth. In the face of such destructive natural disasters such as Hurricane Sandy, it's imperative we understand and protect the soil which feeds and protects us. Knowledge of the numerous characteristics of soil such as texture, composition, pH, and moisture all aid us in utilizing it as efficiently as possible. This is crucial, as the state of our soil directly effects our own health, well-being, and continued survival.

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Association of Age, Gender, and Race with Voting Preference in 2016 Presidential Elections in Suffolk County

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

Abstract:

Following the 2016 United States Presidential Elections, a study was done to determine association of variety of factors with voting preference. Considering the factors of age, race, and gender, we used chi-square test of independence, using 5% and 10% significance, obtain an overall result that race of voters had the most considerable association in this year's presidential election, in Suffolk County.

Introduction:

Known for being one of the most controversial elections in US history, the 2016 election was called for Donald Trump as our 45th President of the United States of America, over his democratic opponent, Hillary Clinton. A study done earlier this year by Emily Atchison, did in fact accurately conclude the election's outcome, in Suffolk County. As she polled individuals of varying age and gender, there was a clear indication the Trump would win with a significant margin in Suffolk County.

This study addresses the influence of age, race, and gender in Suffolk County Polls, and their contribution to the election's results. The data in this study was collected from 303 Suffolk County voters.

Note:

We used abreviations "White," "Black," and "Asian" for what is customarily called "Caucasian," "African-American," and "Asian-American."

Methods:

Limited to Suffolk County residents, the voters were polled for this survey, all varying in age, gender, and race. They were then asked which candidate they had voted for. They were contacted via phone call and person-to-person interviews, to validate their answers. The data was then tabulated into standard contingency tables.

Results:

The following are contingency tables for all three associations together with calculated expected values. "O" stands for observed from the actual poll. "E" stands for expected as calculated from the overall observed values in contingency tables.

Age:

	18-29	30-44	44-64	65+
Clinton O: E:	54 52.182	24 26.889	47 46.802	38 37.119
Trump O: E:	36 39.056	23 20.132	34 35.030	29 27.782
Other O: E:	7 5.762	3 2.970	6 5.168	2 4.099

Race:

	White	Black	Hispanic	Asian	Other
Clinton O: E:	60 88.713	49 33.267	38 29.043	11 6.337	2 2.640
Trump O: E:	94 68.752	13 25.782	14 22.508	1 4.911	2 2.046
Other O: E:	14 10.535	1 3.950	3 3.449	0 .752	1 .314

Gender:

	Male	Female
Clinton O: E:	74 77.713	93 89.287
Trump O: E:	52 52.119	60 59.881
Other: O: E:	15 11.168	9 12.832

The results will be used to see whether there was any association of specific factors and voting preference. Using the data collected from the surveys, or the observed values, the expected values were calculated. Once obtained, the p-values for each contingency table was calculated using $\chi 2$- Tests. Results show that race had the smallest P-value of 1.829155 E -23, followed by gender with a P-value of .2477009241, and lastly age with a P-value of .8567143599.

Discussion:

Evident from our survey, along with Atchison's research, there is a measurable difference between the Republican and Democratic vote in terms of race. According to media outlets *Politico,* comparable results were also observed in the Congressional Elections. District 1 and 2, which make up the majority of Suffolk County, voted Republican with 59.0% in District 1, and 62.4% in District 2. In district 3, which is shared with Nassau County, results differed. Democrat had the overall win for this district, with 52.4% of the votes.

In addition, UK media outlet *Independent* shows, through data collected from the New York Times, that white males contributed the most to Trump's win, over any other race and gender combination. An estimated 63% of white men voted for Trump, compared to the 52% of white women. There was a considerable difference between the races for this year's election as noted from the surveys. Nonetheless, the national data did not differ. 53% of White persons voted Trump, with a notable difference of only 8% of Black individuals who voted for him.

Taking only gender into consideration, information shows that there was a 12 percent difference between males who voted Republican, and those who voted Democratic. And although presented as the least significant in this study, age can be observed as having a noticeable effect in the election as well. Ages at each end of the spectrum had complete opposite votes for this election. The youngest age group, 18- 29, demonstrated 55% of their support for Clinton, to oppose the 65+ age group, who portrayed 53% of their support for Trump.

Our results in Suffolk County were somewhat different.

Conclusion:

Our study analyzed that among the three factors we examined, only a race factors had significant association with voting preference, as seen from the p-value compared to both a 10% and 5% significance. With a P-value of almost 0%, race is distinguishably the biggest factor, out of the three studied in this survey. In this study, age resulted in having a p-value of 86%, ultimately having insignificant association with voting preference. Gender was identified as having a p-value of 25%, making it statistically insignificant in our study. For further analysis we would suggest to examine other factors such as religious affiliation and household income, the data on which we did not include in our poll.

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

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Keywords: Coniferous, Deciduous, Dominant, Long Island

Abstract:
One hundred one trees were classified using the dichotomous keys (Watt's 1998, Watts & Watts 1970). It was found that coniferous plants were dominant across the north shore of Long Island and deciduous plants were dominant across the south shore of Long Island.

Introduction:

According to the New York State Department of Environmental Conservation (2004) "Long Island is known for its variety in trees." The soil on the north shore begins from the Peconic River and continues towards Orient Point. The height above sea level on the north shore is between 12-13 feet (3.66 – 3.96 meters). In this area it is common to come across pine trees, maple, oaks, and cedar.

The north shore contains many coniferous trees. A coniferous tree is known by its pointed needles and flat scales. The south shore begins at the edge of the Pine Barrens, a town in Southampton, and continues towards Montauk Point. The height above sea level in the south shore is between 15-16 feet (4.57 – 4.88 meters). The south shore is made up of deciduous trees, or trees that tend to lose their leaves at specific parts of the year (Arrington, 2012). In order to find and identify these types of trees, it is necessary to use a dichotomous key, which is a method which is used to identify specific tree species.

Method:

We first gathered tree samples from four residential properties on Long Island. A total of one hundred and thirty five tree samples were collected. Each plant had a moderate sized bud. The tree samples were collected from Northport, Commack, Deer Park, Brentwood and Bay Shore. Next, the investigators were supplied with the Winter Tree Finder: A Manual for Identifying Deciduous Trees in Winter (Watts & Wattts,1970) and Tree Finder: A Manual for Identification of Trees by Their Leaves (Watts,1998) to identify the plant species. The investigators started with plant sample one and followed the directions on how to classify the sample using the Tree Finder (19790) book. The investigators then continued the process of classification for all samples. After naming each plant species the data was recorded into notebooks and each plant was then labeled with its correct scientific name.

Results:

All trees found on the north shore in Northport were found to be coniferous trees, along with all trees found in Deer Park and Commack (Table 1). All trees found on the south shore in Bay Shore and Brentwood were found to be deciduous trees (Table 1). There were a total of twelve tree species found in the north shore and seventeen tree species found on the south shore of Long Island.

There were a total of 29 tree species found on both the north and south of Long Island. These were found in Northport:

Arbor Vitae (Thuja orientali)
Chinese Elm (Ulmus parvifolia)
Japanese Maple (Acer palmatum)
Rowan (Sorbus sucuparia)
Flowering Dogwood (Cornus florida)
Red Cedar (Juniperous virgiana)
Tupelo (Nyssa sylvatica)
Water Elm (Ulmas ameicana)

The following were found in Brentwood:

Bayberry (Morella pensylbanic-a)
Rhododendron (Rhodos metron)
Southern White Pine (Chamaecyparis thyoides)
White Cedar (Thuja)

The following were found in Deerpark:

Chokeberry (Aronia ardutifolia)
Pignut Hickory, (Carya glabra),
Prunus (Prunus serotinea)
Sugar Maple (Acer saccharum)
Weeping Willow (Salix Babylonica)

The following were found in Bay Shore:

Bear Oak (Quercus ilicifolia),
Dahoon Holly (Llex cassine),
Red Cedar (Juniperus virginiana),
Sycamore (Platnus occidentalis),
White Hickory.(Carya Tomentosa)

The following were found in Commack:

Blue Oat Grass (Helictotricon semperviren)
Dotted Hawthorn (Crataegus punctate)
Eastern White Pine (Pinus strobus)
Pine (Larik lariane)
Shagbark (Carya ovata)

Of 101 trees taxonomically classified in this study, 62 (61%) are coniferous while 39 (39%) are deciduous.

Table 1- Coniferous and Disingenuous Trees on Long Island

Species Name	Coniferous/ Deciduous	Location	Common name	Number of tree samples
Acer palmatum	Coniferous	Northport	Japanese Maple	5
Aronia ardutifolia	Coniferous	Deer park	Chokeberry	2
Carya ovata	Coniferous	Commack	Shagbark	5
Chamaecyparis thyoides	Deciduous	Brentwood	Southern White Pine	3
Cornus florida	Coniferous	Northport	Flowering Dogwood	4
Juniperus virginiana	Deciduous	Bay shore	Red Cedar	7
Larik lariane	Coniferous	Commack	Pine	5
Llex cassine	Deciduous	Bay shore	Dahoon Holly	6
Morella pensylbanic	Deciduous	Brentwood	Bayberry	5
Pinus strobus	Coniferous	Commack	Eastern White Pine	4
Prunus serotinea	Coniferous	Deer park	Prunus	4
Salix babylonica	Coniferous	Deer park	Weeping Willow	3
Sorbus sucuparia	Coniferous	Northport	Rowan	2
Thuja orientalis	Coniferous	Northport	Arbor vitae	2
Ulmus parvifolia	Coniferous	Northport	Chinese Elm	3

Discussion:
Although both coniferous and deciduous trees are found on Long Island, some are more common than others depending on the specific location of the island. For example, a pine tree such as *Pinus strobus*

and the *Nyssa sylvatica* are native eastern Northern American coniferous trees which are very common on the north side of Long Island according to Long Island Native Nursery (Gettinger, 2007).

When looking at the Southern part of Long Island deciduous trees such as *Quercus ilicifolia* and *Platnus occidentalis* could be found. This study concluded similarly that many of the trees were also found in Northport, Brentwood, Bay Shore Commack and Deer Park. The discoveries were more dispersed than that of previous findings on Long Island.(Greco et al., 2014) This article mentioned that 48% of the samples taken from north shore were oak trees and 25% of the samples taken from the south shore were pine. In contrast to that finding, this study found that pine and cedar trees had been most common among the various properties of Long Island, with only three instances of oak found on Bay Shore properties.

Conclusion:

In this study we found that coniferous trees are dominant on the north shore and deciduous trees are dominant on the south shore of Long Island. Overall, coniferous trees are (61%) dominant to deciduous trees (39%) in this study.

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Oak and Maple Trees are dominate species in Commack and Brentwood

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Key Words: Oak, Maple, Commack, Brentwood

Abstract:
Tree surveys were conducted on two residential properties one in Commack and the other in Brentwood both on Long island New York. A dichotomous key was used to identify and confirm the tree species. In Commack we collected 18 different trees while in Brentwood we collected 30. The towns of Commack and Brentwood boarder each other. In Commack there were 5 White Oak (*Quercus alba*), 2 Red Maple (*Acer rubrum*), 1 American Larch (*Larix laricana*), 7 Sycamore (*Acer pseudo platanus*) and 3 Hackberry trees (*Celtis occidentials*). Brentwood had some similar results. There were 10 Shingle Oak (*Quercus imbricarai*), 4 Sycamore (*Acer pseudo platanus*), 4 Jack Pine (*Pinus banksiana*), 2 American Elm (*Ulmus americana*), 5 Norway Maple *(Acer platanoides*), 3 White Spruce (*Picea glauca*) and 2 Sugar Maple *(Acer saccharum*). The tree species that are similar to Commack and Brentwood are the Oaks (*Quercus alba*, *Quercus imbricarai*), Maple (*Acer saccharum, Acer platanoides*) and Sycamore trees (*Acer pseudo platanus*).

Introduction:
The climates of Commack and Brentwood are very similar, facing the same climate changes throughout the year (Sperling 2015). Commack and Brentwood both have rainfall (cm.) of 117, snowfall (cm.) is 51, precipitation days 118, avg. July high 28 ^{0}C and avg. January high -4 ^{0}C. In Brentwood there are sunny days 204, avg and in Commack 207.

Methods:
The students went around each property collecting their data, Brentwood being 4046.86 square meters and Commack being 2023.43 square meters (Google 2016). The two separate properties from Brentwood and Commack is the driving distance of 5.7 miles (Google maps 2015). After finding the branches the students brought their results to the lab to determine the different tree species using a dichotomous key (Watts, 1998). The dichotomous key was also used to discover which species were native to Long Island.

Results:
Based on the information collected from our two properties we were able to identify which tree species were native and which were non-nation to Long Island. Out of the forty-eight samples we found that twenty-six were native and twenty-two were not native. In Commack 100% of the trees found were native. In Brentwood 73% were non-native making 27% native. The tree species that are native are as follows; American Elm (*Ulmus americana*), American Larch (*Larix laricana*), Hackberry trees (*Celtis occidentials*), Red Maple (*Acer rubrum*), Sugar Maple *(Acer saccharum*), Sycamore (*Acer pseudo platanus*), White Oak (*Quercus alba)*.

The species non-native are the Shingle Oak (*Quercus imbricarai*), Jack Pine (*Pinus banksiana*), Norway Maple *(Acer platanoides*) and the White Spruce (*Picea glauca*). The tree species that are similar to Commack and Brentwood are the Oaks (*Quercus alba*, *Quercus imbricarai*), Maple (*Acer saccharum, Acer platanoides*) and Sycamore trees (*Acer pseudo platanus*).

Table 1: Location of Collected Samples

Town	Latitude	Longitude	Property size
Brentwood	Lat: 40.8427778	Long: -73.2933333	4046.86 square meters
Commack	Lat: 40.7811111	Long: -73.2466667	2023.43 square meters

Table 2: Tree species in Commack

Common name	Scientific name	Quantity on location	% of total trees	Native or Non-Native
American Larch	*Larix laricana*	1	6%	Native
Hackberry	*Celtis occidentials*	3	17%	Native
Red Maple	*Acer rubrum*	2	11%	Native
Sycamore	*Acer pseudo platanus*	7	39%	Native
White Oak	*Quercus alba*	5	28%	Native

Table 3: Tree species in Brentwood

Common name	Scientific name	Quantity on location	% of total trees	Native or Non-Native
American Elm	*Ulmus americana*	2	7%	Native
Jack Pine	*Pinus banksiana*	4	13%	Non-Native
Norway Maple	*Acer platanoides*	5	17%	Non-Native
Shingle Oak	*Quercus imbricarai*	10	33%	Non-Native
Sugar Maple	*Acer saccharum*	2	7%	Native
Sycamore	*Acer pseudo platanus*	4	13%	Native
White Spruce	*Picea glauca*	3	10%	Non-Native

Discussion:

We found that non-native trees were found more in Brentwood than in Commack. The tree species found in Commack were all native to Long Island, the White Oak (*Quercus alba*), Red Maple (*Acer rubrum*), American Larch (*Larix laricana*), Sycamore (*Acer pseudo platanus*) and Hackberry trees (*Celtis occidentials*). The native species found in Brentwood were the Sycamore (*Acer pseudo platanus*), American elm (*Ulmus Americana*) and the Sugar Maple (*Acer saccharum*). The non-native trees were the Jack Pine (*Pinus banksiana*), Norway Maple (*Acer plantanoides*) and the White Spruce (*Picea glauce*). Native verse non-native was determined using Watts (1991).

Conclusion:

With the help of a dichotomous key we were able to identify 48 trees from two different towns on Long Island. In Commack we found 5 White Oak (*Quercus alba*), 2 Red Maple (*Acer rubrum*), 1 American Larch (*Larix laricana*), 7 Sycamore (*Acer pseudo platanus*) and 3 Hackberry trees (*Celtis occidentials*). With the 18 different trees found 100% were native and 0% were non-native.

In Brentwood there were 10 Shingle Oak (*Quercus imbricarai*), 4 Sycamore (*Acer pseudo platanus*), 4 Jack Pine (*Pinus banksiana*), 2 American Elm (*Ulmus americana*), 5 Norway Maple *(Acer platanoides*), 3 White Spruce (*Picea glauca*) and 2 Sugar Maple *(Acer saccharum*). Among the 30 different tree species found 73% were non-native and 27% were native. The dominate species were the Oaks (*Quercus alba*, *Quercus imbricarai*), Maple (*Acer saccharum, Acer platanoides*) and Sycamore trees (*Acer pseudo platanus*).

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Deciduous Trees Are Dominant to Coniferous Trees in Belmont Lake State Park

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Keywords: Deciduous, Coniferous, North Babylon

Abstract:
At Belmont Lake State Park in West Babylon 51 tree samples were identified using two tree identification apps called VTree and IdenifyTree as well as the websites called Know Your Trees W/ Art and the Tree Identification Key . After identifying a total of 51 trees, we found that there are more deciduous trees then coniferous trees on this particular property. 11 out of the 51 were coniferous and 40 out of the 51 were deciduous (21.5% coniferous and 78.4 deciduous). The most common tree that we found was Yellow birch. This counted as 12 out of the 51 trees and was deciduous. (23.5 % yellow birch).

Introduction:
The following information was retrieved from dictionary.com (2016): deciduous trees are trees that drops their leaves in the fall and becomes dormant in the winter, or have leaves falling off in a particular season or growth. Coniferous trees are mostly known as evergreens and have needles instead of broad, flat leaves and trees that reproduce via cones. In this study we gathered samples of trees from Belmont State Park in West Babylon on Long Island in New York. Out of the 51 samples there were multiple species of trees. Belmont lake state park is covered by 1.874e+6 square meters of land (463 acres). Of this area, 3.076e+4 square meters (7.6 acres) of this land are covered by trails that are surrounded by at least 1.214e+6 square meters (300 acres) of forest area. When the study was conducted the seasons were changing from fall to spring making it easier to identify the leaves and flowers growing on the trees.

Methods:
First we picked four trees surrounding the outside perimeter, of the section of the park, where we were gathering our tree samples. Then all three students were sent throughout the forest area to gather 17 tree samples each. Distributed throughout the forest area we measured, we found multiple species of trees. In order to identify them we all used the two apps, Vtree (2014) and IdentifyTree (2015) that allowed us to take pictures of the sample or look at the leaves and shape of the branch to identify the species. If we weren't sure we also used a website called Know Your Trees w/Art supported by Cornell University (2001) (http://cortland.cce.cornell.edu/resources/know-your-trees). We were able to look at the drawings and descriptions and could compare our sample with the descriptions and drawings given. We used a website that was a tree identification key at the New York State Department of Environmental Conservation (1993) (http://www.dec.ny.gov/docs/lands_forests_pdf/treeidkey.pdf). This website helped us to see if the tree was a deciduous or coniferous tree. Then using the New York State Park and Recreations website (2016) (http://nysparks.com/parks/88/details.aspx), we were able to find out the longitude and latitude of the park.

Results:
After analyzing a total of 51 tree samples we found that there was a greater amount of deciduous trees spread throughout the park. Forty out of the 51were deciduous (78.4%) and 11 out of the 51 were coniferous (21.5%). This suggest that deciduous trees are dominant to coniferous trees in Belmont Lake

State Park. In Table 1 it is easy to see that most of the trees are deciduous and that the most common tree is Yellow Birch. The deciduous trees that were found include the following:

Yellow Birch (*Betula alleghaniensis* Britton)	12
Sugar Maple (*Acer saccharum* Marshall)	7
Shagbark Hickory (*Carya ovata* (Miller Koch)	6
Black Cherry (*Prunus serotina* Ehrhart)	5
American Elm (*Ulmus americana* Linnaeus)	4
Pin Oak (*Quercus palustris* Muenchhausen)	4
American Hophornbeam (*Ostrya virginiana)*	2

The coniferous trees that were found include seven Eastern White Pine (*Pinus strobus* Linnaeus) and four Eastern Hemlock (*Tsuga canadensis* (Linnaeus) Carriere) trees.

Table 1: Coniferous vs Deciduous Trees in Belmont Lake State Park

Common Name	Species Name	# Count	Deciduous	Coniferous
American Elm	*Ulmus americana* Linnaeus	4	X	
American Hophornbeam	*Ostrya virginiana* (Miller) Koch	2	X	
Black Cherry	*Prunus serotina* Ehrhart	5	X	
Eastern Hemlock	*Tsuga canadensis* (Linnaeus) Carriere	4		X
Eastern White Pine	*Pinus strobus* Linnaeus	7		X
Pin Oak	*Quercus palustris* Muenchhausen	4	X	
Shagbark Hickory	*Carya ovata* (Miller) Koch	6	X	
Sugar Maple	*Acer saccharum* Marshall	7	X	
Yellow Birch	*Betula alleghaniensis* Britton	12	X	

*Latitude: 40.734316
*Longitude: -73.338525

Conclusion:
Fifty one trees were classified on the property of Belmont Lake State Park. In the study we found that deciduous trees are dominant in the area over coniferous trees. 40 out of the 51 were deciduous

(78.4%) and 11out of the 51 that were coniferous (21.5%).

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Trees with Compound Pinnate Leaves Are Dominant over a Variety of Different Species Found in Residential Areas in Central Suffolk County

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Keywords: Pinnate, Leaves, Suffolk

Abstract:

A total of 40 different tree samples were examined and classified based on their characteristics. The number of trees with Simple Palmate leaves, Compound Palmate leaves Simple Pinnate leaves and Compound Pinnate leaves was compared. Upon completion of categorizing and identifying each leaf, we concluded that trees with Compound Pinnate leaves were the most common, and trees with Compound Palmate leaves were the least common found in this study.

Introduction:

Leaf specimens were divided into 4 different categories, which are Simple Palmate, Simple Pinnate, Compound Palmate, and Compound Pinnate. Simple Palmate is a leaf that resembles an open hand and has veins radiating from a common point. A Simple Pinnate is a leaf, which has leaflets or primary divisions arranged on each side of the common stalk. Compound Pinnate leaves are leaves with a blade that has two or more subunits called leaflets. The leaflets radiate from a single point at the distal end of the petiole. A Compound Pinnate is a leaf with a row of leaflets that form on either side of an extension of the petiole. (Jackikellum 2016)

Method:

Forty specimens were collected from five different residential properties located in, Islip, East Islip, Hauppauge, Holbrook, Commack and West Babylon. Samples were branches with a minimum of three leaves. The specimens were placed into one of the four categories according to characteristics such as shape, vein pattern and texture of the leaf. The Dichotomous Key "A Field Guide to Eastern Trees" *(*Petrides and Wehr 1998*),* and mobile apps such as "TreeFinder" (Watts 1998), "LeafSnap" (Belhumeur 2015), and "VTree" (Seiler and Peterson 2012) were used for verification. Information such as latitude, longitude and elevation were gathered by using Google Maps and Coordinates (Google 2016).

Results:

The trees with Simple Palmate leaves were Silver Maple (*Acer saccharum*), Edible Fig (*Fiscus carica*), Sassafras (*Sassafras albidum*), Black Ash, (*Fraxinus nigra*) Sycamore Maple (*Acer pseudoplatanus*), Downy Oak (*Quercus pubescens*), Red Maple (*Acer rubrum*), Arrowwood Viburnum (*Viburnum dentatum*), Sweet Gum (*Liquidambar styraciflua*), and Flowering Pear (*Pyrus calleryana*). The trees with Compound Palmate leaves were Red Oak (*Quercus rubra)*, Eastern Hemlock (*Tsuga canadensis)*, Shortleaf Pine (*Pinus echinata*), Balsam Fir (*Abies balsamea*), Japanese Maple (*Acer palmatum*), Eastern Red Cedar (*Juniperus virginiana*), and American Linden (*Tilia americana*). The trees with Simple Pinnate leaves were the Pin Oak (*Quercus palustris*), Kinnickinnick (*Arctostaphylos uva-ursi*), River Birch (*Betula nigra*), American Hornbeam (*Carpinus caroliniana*), Kentucky Yellow Wood, (*Cladrastis kentukea*) American Holly (*Ilex opaca*), Winterberry (*Ilex verticillata*), Black Tupelo (*Nyssa sylvatica*), European Pear (*Pyrus communis),* Sugar Maple (*Acer saccharum*) and Cranberry

Viburnum (*Viburnum opulus*). The trees with Compound Pinnate leaves were the Colorado Spruce (*Picea pungens*), White Cedar (*Thuja occidentalis*), Creeping Juniper, (*Juniperus horixontalis*) Monkshood (*Aconitum noneboracense*), Black Spruce (*Picea mariana*), Hemlock (*Tsuga canadensis*), Wood Fern (*Dryopteris filix-mas*), Inkberry (*Ilex verticillata*), Blue Spruce, (*Picea pungens*) Highbush Blueberry (*Vaccinium corymbosum),* Common Juniper, (*Juniperus*) and White Pine (*Pinus strobus*).

Table 1: Geological locations of each property.

16 Columbine Ave, Islip, NY 11751	Latitude: 40.746326 Longitude: -73.220347 Elevation: 32.36
14 Auburn St, West Babylon, NY 11704	Latitude: 40.697607 Longitude: -73.340568 Elevation: 16.08
7 Heron Lane, Commack, NY 11725	Latitude: 40.828074 Longitude: -73.271063 Elevation: 141.26
329 Ridgefield Road, Hauppauge, NY 11788	Latitude: 40.815063 Longitude: -73.2294639 Elevation: 27.11
853 Broadway Ave, Holbrook, NY 11741	Latitude: 40.7801 Longitude: -73.066581 Elevation: 22. 09

Table 2: Simple Pinnate Leaf Samples.

Type of Tree	**Scientific name**
Pin Oak	*Quercus palustris*
Kinnickinnick (BearBurry)	*Arctostaphylos uva-ursi*
River Birch	*Betula nigra*
American Hornbeam	*Carpinus caroliniana*
Kentucky Yellow Wood	*Cladrastis kentukea*
American Holly	*Ilex opaca*
Winterberry	*Ilex verticillata*
Black Tupelo	*Nyssa sylvatica*
Sugar Maple	*Acer saccharum*
Cranberry Viburnum	*Viburnum opulus*

European Pear	*Pyrus communis*
Total Simple Pinnate:	11 Leaves
Percent of Total:	11%

Table 3: Simple Palmate Leaf Samples.

Type of Tree	**Scientific name**
Silver Maple	*Acer saccharum*
Edible Fig	*Ficus carica*
Sassafras	*Sassafras albidum*
Black Ash	*Fraxinus nigra*
Sycamore Maple	*Acer pseudoplatanus*
Red Maple	*Acer rubrum*
Downy Oak	*Quercus pubescens*
Arrowwood Viburnum	*Viburnum dentatum*
Sweet Gum	*Liquidambar styraciflua*
Flowering Pear	*Pyrus calleryana*
Total Simple Palmate:	10 Leaves
Percent of Total:	10%

Table 4: Compound Pinnate Leaf Samples.

Type Of Tree	**Scientific Name**
Colorado Spruce	*Picea pungens*
White Cedar	*Thuja occidentalis*
Creeping Juniper	*Juniperus horizontalis*
Black Spruce	*Picea mariana*
Monkshood	*Aconitum noveboracense*

Hemlock	*Tsuga canadensis*
Wood Fern	*Dryopteris filix-mas*
Inkberry	*Ilex verticillata*
Blue Spruce	*Picea pungens*
Highbush Blueberry	*Vaccinium corymbosum*
Common Juniper	*Juniperus*
White Pine	*Pinus strobus*
Total Compound Pinnate:	12 Leaves
Percent of Total:	12%

Table 5: Compound Palmate Leaf Samples.

Type of Tree	**Scientific Name**
Red Oak	*Quercus rubra*
Eastern Hemlock	*Tsuga canadensis*
Shortleaf Pine	*Pinus echinata*
Balsam Fir	*Abies balsamea*
Japanese Maple	*Acer palmatum*
Eastern Red Cedar	*Juniperus virginiana*
American Linden	*Tilia americana*
Total Compound Palmate:	7 Leaves
Percent of Total:	7%

Trees with Compound Pinnate leaves were the most common, and trees with Compound Palmate leaves were the least common found in this study.

Discussion:
In this study, we found that trees with Compound Pinnate leaves were the most common trees found among Hauppauge, Holbrook, West Babylon, Islip, East Islip and Commack New York. Molloy et al. (2016) found that trees with Compound Palmate leaves were least common trees found and trees with Simple Palmate leaves were the most commonly found in their locations of Kings Park, Commack, Brentwood, and Central Islip. Both groups found different leaf samples, however, found similarities within their results. By comparing our results with those of Molloy et al. (2016), we were able to suggest that trees with Compound Pinnate leaves are most common trees found in Suffolk County residential areas.

Conclusion:
Forty trees were classified from Hauppauge, Holbrook, West Babylon, East Islip, Islip and Commack. The species that had Simple Palmate leaves that were classified were Silver Maple (*Acer saccharum*), Edible Fig (*Fiscus carica*), Sassafras (*Sassafras albidum*), Black Ash, (*Fraxinus nigra*) Sycamore Maple (*Acer pseudoplatanus*), Downy Oak (*Quercus pubescens*), Red Maple (*Acer rubrum*), Arrowwood Viburnum (*Viburnum dentatum*), Sweet Gum (*Liquidambar styraciflua*), and Flowering Pear (*Pyrus calleryana*). The trees with Compound Palmate leaves that were classified were Red Oak (*Quercus rubra)*, Eastern Hemlock (*Tsuga canadensis)*, Shortleaf Pine (*Pinus echinata*), Balsam Fir (*Abies balsamea*), Japanese Maple (*Acer palmatum*), Eastern Red Cedar (*Juniperus virginiana*), and American Linden (*Tilia americana*). The trees with Simple Pinnate leaves were the Pin Oak (*Quercus palustris*), Kinnickinnick (*Arctostaphylos uva-ursi*), River Birch (*Betula nigra*), American Hornbeam (*Carpinus caroliniana*), Kentucky Yellow Wood, (*Cladrastis kentukea*) American Holly (*Ilex opaca*), Winterberry (*Ilex verticillata*), Black Tupelo (*Nyssa sylvatica*), European Pear (*Pyrus communis),* Sugar Maple (*Acer saccharum*) and Cranberry Viburnum (*Viburnum opulus*). The trees with Compound Pinnate leaves were the Colorado Spruce (*Picea pungens*), White Cedar (*Thuja occidentalis*), Creeping Juniper, (*Juniperus horixontalis*) Monkshood (*Aconitum noneboracense*), Black Spruce (*Picea mariana*), Hemlock (*Tsuga canadensis*), Wood Fern (*Dryopteris filix-mas*), Inkberry (*Ilex verticillata*), Blue Spruce, (*Picea pungens*) Highbush Blueberry (*Vaccinium corymbosum),* Common Juniper, (*Juniperus*) and White Pine (*Pinus strobus*). Compound Palmate leaves were the least commons to be found in the residential areas listed above.

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The Dominance of Sycamore Trees in Commack

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Keywords: Sycamore, Commack

Abstract:
The longitude and latitude of participants' homes were discovered and reported. Samples were then collected from 123 trees on multiple locations of the participants' properties. The samples were observed and compared before they were identified. Participants used dichotomous keys in order to determine the species of the trees from which the samples were collected. The results show that there was a representation of many different species, yet the majority of the samples came from Sycamore trees.

Introduction:
After studying a small sample of the tree populations of two Commack residential properties, it was hypothesized that Sycamore trees (*Plantaous occidentalis)* are the dominant species in Commack. In order to test this hypothesis, samples were taken from every tree on two residential properties and identified using a dichotomous key. The purpose of this experiment was to see if Sycamore trees are in fact the dominant species of trees in Commack and to attempt to understand why they might be dominant.

Sycamores have a large range in the United States. The range spans to every state east of the Great Plains (McAlpine & Applefield, 1973). McAlpine and Applefield state that Sycamores grow in small groups in environments just above sea level with an average temperature range of 40 to 70 degrees Fahrenheit.

CustomWeather (2016) states that the lowest average temperature in Commack, NY is 23 degrees Fahrenheit, while the highest average temperature in Commack is 81 degrees Fahrenheit, and that Commack is roughly 131 feet above sea level. According to Willson et al. (1982), Sycamores are "a rapid growing species that are relatively free from insect and disease attack." People may plant superior species of trees that can exist to solve some ecological problems (Santamour Jr., 2004). Santamour Jr. states that the difference between natural growth and simulated growth may cause reproduction of the planted species, thus causing further diversification within the environment.

Methods:
The longitude and latitude of two residential properties was found using EarthExplorer (USGS, 2016) on the web at www.earthexplorer.usgs.gov and recorded in order to determine the locations of 123 tree samples. These samples were then taken from each tree on the participant's properties to represent the entire population of trees. The dichotomous key (Watts, 1998) served to identify the species of each sample. Once each sample was identified, they were compared to see if there were any trends in the data. The different species and their quantities were recorded.

Results:
As shown in Table 2, there were a variety of trees found in Commack. Although 90 of the Sycamore trees were from property 1, Sycamores were still overwhelmingly more numerous than any

other tree found in the two locations. The following trees were found:

American Larch *(Larix laricina),* two
Arbor Vitae *(Thuja orientalis)*, one
Black Ash *(Fraxinus nigra)*, two
Box Elder *(Acer negundo)*, one
European Beech *(fagus sylvatica)*, nine
European Larch *(Laria decidua)* tree
Flowering Dogwood *(Cornus florida)*, two
Hardy Catalpa *(Catalpa speciosa)*, two
Live Oak *(Quercus virginiana)*, two
Silver Maple *(Acer saccharinum)*, two
Sycamore *(Plantaous occidentalis)*, ninety five
Sweetgum *(Liquidambar styraciflua)*, one
Willow Oak *(Quercus phellos)*, one

It was also found that Box Elders, Sweetgums, Live Oaks, Willow Oaks, and European Larches each make-up 0.8% of the data, while Black Ashes, American Larches, Hardy Catalpas, Silver Maples, Flowering Dogwoods, and European Beeches each make-up 1.6% of the data. The population of Arbor Vitaes were found to make-up 7.3% of the data and the remaining 77.0% of the data consisted of Sycamore trees.

Table 1: Latitude and Longitude of Properties 1 and 2

Property	Latitude	Longitude
Property 1	40.8487	-73.2722
Property 2	40.8694	-73.2827

Table 2: Trees Found On Two Commack Properties

Type of Tree (*Genus species*)	Number of Tree	Percentage	Property
American Larch (*Larix laricina*)	2	1.6%	2
Arbor Vitae (*Thuja orientalis*)	9	7.3%	1
Black Ash (*Fraxinus nigra*)	2	1.6%	2
Box Elder (*Acer negundo*)	1	0.8%	2
European Beech (*Fagus sylvatica*)	2	1.6%	2
European Larch (*Larix decidua*)	1	0.8%	1
Flowering Dogwood (*Cornus florida*)	2	1.6%	2
Hardy Catalpa (*Catalpa speciosa*)	2	1.6%	2

Live Oak (*Quercus virginiana*)	1	0.8%	2
Silver Maple (*Acer saccharinum*)	2	1.6%	2
Sweetgum (*Liquidambar styraciflua*)	1	0.8%	2
Sycamore (*Plantaous occidentalis*)	95	77.0%	1 and 2
Willow Oak (*Quercus phellos*)	1	0.8%	1

Discussion:
A similar study found that Hackberry and Blue Spruce trees were the most common in Commack (Messina et al. 2015). This could be considered more significant if the most common trees didn't just have two trees each. This could be due to a small sample size or a large amount of imported trees from other locations on their properties.

Conclusion:
123 tree samples from Commack were taxonomically classified. The majority of the samples from two residential Commack properties were Sycamore trees (*Plantaous occidentalis)*. These properties were located in different parts of Commack, yet they provided similar results. These results suggest that *Plantaous occidentalis* is by far the dominant type of tree in the Commack.

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Introduced Tree Species Prevail Over Native Tree Species in Residential Properties of Commack, Babylon and Lindenhurst

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Abstract:
Fifty tree branch samples were taken from four separate properties across Suffolk County, New York. The properties were located in Commack, West Babylon, and Lindenhurst. The following trees were identified using a dichotomous key: White Ash (*Fraxinus americana*), White Oak (*Americanus alba*), Cherry Blossom (*Prunus serrulata*), Green Ash (*Fraxinus pennsylvanica*), Leyland Cypress (*Cupressus leylandii*), Longleaf Pine (*Pinus palustris*), White Pine (*Pinus strobus*), Pitch Pine (*Pinus rigida*), Arborvitae (*Thuja*), Japanese Maple (*Acer palmatum*), Red Oak (*Quercus rubra*), Douglas Fir (*Pseudotsuga menziesii var*), and Red Cedar (*Juniperus virginiana*). The tree species were divided into two categories, introduced and native species to the Northern Hemisphere of the United States, by using an internet web page "plants.usda.gov". The results suggest a very diverse catalog of trees across Suffolk County and that introduced tree species prevail over native tree species in Commack, West Babylon, and Lindenhurst.

Introduction:
Suffolk County has developed a diverse population of tree species due to modern, aesthetic, and creative landscaping. It enables many species to continue life where life would not be possible without human interaction. This is simply due to the tree species reproduction habits. A dichotomous key was used to identify our samples.
These dichotomous keys helped classify different species using the trees traits as a gauge to which the tree may or may not have. These traits would include the characteristics of the plants and simple admixtures of leaves. All four areas surveyed have similar environments and weather conditions. Tree samples were characterized as "introduced" or "native". They are defined in the following order: as trees not native to the Northeastern Hemisphere, and as trees naturally occuring in the Northeastern Hemisphere. The definition and characterization of the trees surveyed was provided by the United States Department of Agriculture. (USDA PLANTS 2016)

Method:
There were three residential properties involved in this study. The residential properties resided in towns Commack, West Babylon, and Lindenhurst. A total of 50 tree samples from the respected properties were gathered. In addition, latitude, longitude and the size of each property were found using FindLotSize.com.
We recorded data of each location's latitude and longitude, region on long island, and town. Tree types, and property size are recorded in Table-1. With the use of a dichotomous key (Watts 1998), 50 species of tree were identified on the studied properties.
The Arbor Day Foundation's website (2016), (https://www.arborday.org/What Tree Is That?), was used to classify the trees. The identified trees were then placed in Table-2a to show the location of where they were found and the number of trees each species had on the property. In addition, each tree species was marked with a "C" or "D" to represent if it was either coniferous or deciduous. Table- 2b expressed

the ratio of coniferous to deciduous trees on each property. In Table-3 the identified trees were then classified as introduced or native to the surveyed regions. The information gathered determined if there were more commonly found species on Long Island's North and South shore.

Results:
Based on the data that we collected from the residential properties of Commack, West Babylon and Lindenhurst we came to the conclusion that there is a greater number of introduced trees rather than native trees to the area. Out of the 13 tree species that we had collected on our properties we found that there were only 5 introduced tree species and there were 8 native tree species. It was found that 36 trees identified as coniferous were as 14 were shown to be deciduous. Out of the 50 tree samples that were collected it was found that 27 samples were introduced species and the other 23 belong to native species of the areas. Commack resides at an elevation 50.9016m. West Babylon resides at an elevation of 14.9352m. Lindenhurst resides at an elevation of 7.9248m. (Google Map Developers 2016 "Google." *Elevation Calculator*. N.p., n.d. Web. 15 Apr. 2016).

Table 1: Properties in Suffolk County New York

	Property 1	Property 2	Property 3	Property 4
Town	Commack	West Babylon	Lindenhurst	Lindenhurst
Region	North Shore	South Shore	South Shore	South Shore
Latitude / Longitude	40.835082/ -73.304507	40.716516/ -73.349087	40.694835/ -73.386198	40.691989/ -73.369894
Number of Trees	12	12	14	12
Property Size	11,578 feet^2 (3,528m)	10,840 feet^2 (3,304m)	7,162 feet^2 (2,182m)	9,940 feet^2 (3,029m)
EASL*	50.9016m	14.9352m	7.9248m	7.9248m

*Elevation Above Sea Level, in meters
Property size was found using the web link provided: FindLotSize.com

Table 2a: Trees on Each Properties

Property 1 Commack	Property 2 West Babylon	Property 3 Lindenhurst	Property 4 Lindenhurst
8 Leyland Cypress (C)	6 Longleaf Pine (C)	2 Cherry Blossom (D)	1 Red Oak (D)
3 Arborvitae (C)	3 White Pine (C)	3 White Ash (D)	2 Green Ash (D)
1 Japanese Maple (C)	3 Pitch Pine (C)	5 White Oak (D)	3 Red Cedar (C)
-	-	4 Leyland Cypress (C)	6 Douglas Firs (C)

C= Coniferous (a tree that bears cones and evergreen needlelike or scalelike leaves)
D= Deciduous (shedding its leaves annually)

Table 2b: Coniferous v.s. Deciduous on Each Properties, Expressed as a Ratio

Property 1 Commack	Property 2 West Babylon	Property 3 Lindenhurst	Property 4 Lindenhurst	All Properties
11:1	12:0	4:10	9:3	36:14

*The classification of conifers and deciduous species was supported by the link provided: http://www.forestryimages.org/browse/catsubject.cfm?cat=58

Table 3: Trees Common to Suffolk County

Common Name of Tree	Species Name	Total Number of Trees	Introduced[1]	Native[2]
Arborvitae	*Thuja*	3		X
Cherry Blossom	*Prunus serrulata*	2	X	
Douglas Firs	*Pseudotsuga menziesii var*	6	X	
Green Ash	*Fraxinus pennsylvanica*	2		X
Japanese Maple	*Acer palmatum*	1	X	
Leyland Cypress	*Cupressus leylandii*	12	X	
Longleaf Pine	*Pinus palustris*	6	X	
Pitch Pine	*Pinus rigida*	3		X
Red Cedar	*Juniperus virginiana*	3		X
Red Oak	*Quercus rubra*	1		X
White Ash	*Fraxinus americana*	3		X
White Oak	*Americanus alba*	5		X
White Pine	*Pinus strobus*	3		X

[1]Introduced: Tree was not native to the Northeastern Hemisphere
[2]Native: Tree was naturally accuring in the Northeastern Hemisphere

Discussion:
As expected, the results of this experiment show a highly diverse range of trees on the north and south shore of Suffolk County. A majority of the trees tested were determined to be introduced to the Northeastern Hemisphere rather than native; (27 to 23 respectively) which is relative to the hypothesis we articulated prior to the experiment.
One interesting note that we made was the lack of correlation between number of trees documented that were introduced to the environment and the elevation above sea level. In comparison to the findings to the published work of Longo et al. (2015), it was found that though they used a slightly larger sample of trees, Non-Native or introduced trees were more commonly identified than trees native to the North and South shore of Long Island. The presumption was made that areas to the North or South shore would have more introduced or even invasive species, since most of the tree were planted by humans. However more testing should be done on a larger scale and collected in different locations to confirm the presumption, simply due to limited testing.

Conclusion:
Through the use of multiple dichotomous keys, 13 different species of trees were identified throughout the Lindenhurst, West Babylon and Commack area. 27 different samples proved to be introduced while only 23 samples proved to be native to the land. By this study, it was observed that introduced and conifer trees are dominant in Suffolk County residential properties. Upon completion of this survey it was clear to see that introduced tree species outnumbered native tree species on residential properties.

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