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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*) 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 the tree survey and studies on the antimicrobial properties of spices 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 MAY 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. In addition, we presented two articles from students at Molloy College that test the effects of teratogens on *Planeria*. We present an article that is a statistical analysis of a 2016 presidential poll. 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 the seventh issue of the *SATURN Journal* we presented an additional article from a microbiology course at SCCC that compares soil bacterial communities on Long Island, an article that compares soil composition from a Chemistry course, and an article that is a statistical study of variables on opinions regarding voting preferences. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the eighth issue of the *SATURN Journal* we presented an article on the effect of carboplatin on tadpole and planarian regeneration, an article on the effects of dopamine and serotonin on bacterial growth, and an article that is a statistical study of variables on opinions of travel bans. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the ninth issue of the *SATURN Journal* we presented an article on the identification of a housekeeping gene for use in inflammatory studies, an article pertaining to the water quality of a lake in in a developing watershed in Minnesota, and an article that is a statistical study of variables on opinions regarding gun control. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the tenth issue of the *SATURN Journal*, we presented two articles authored by students in Ramsey Community College in Minnesota. One of these articles is a study on wildlife restoration, and the other is a water quality study. We also presented multiple articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.

In the eleventh issue of the *SATURN Journal*, we presented a study of the distribution of hard-shelled ticks (*Ixodidae*) in preserves on Long Island, NY. We also presented multiple additional articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC.
In this twelfth issue of the *SATURN Journal*, we present a study of variants in the MC4R gene that could potentially contribute to obesity and weight gain from students at Molloy College in N.Y., a second study from students at Molloy College of the MC1R gene and ageing rate and potential skin carcinoma predispositions, and a DNA barcoding study of a dietary profile for the American Cliff Swallow from students at Moreno Valley College, CA. We also present multiple additional articles that continue the *SATURN J.* Tree Survey from a Principles of Biology course at SCCC. Many of these articles were written by students taking classes during the pandemic, and all of the resources used to collect and analyze data were available for free online.

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*

Peer Review Policy:
Each article published in this issue of the *Science and Technology Undergraduate Research Notes (SATURN) Journal* has been reviewed by two professors from accredited colleges and universities in the United States at the invite of the Editor in Chief of the Journal.

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# In Suffolk County Silver Maples Trees are the Dominant Species

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**Keywords:** Suffolk County, Silver Maple

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**Abstract:**

Sixty-four trees were surveyed in two different residential properties on Long Island New York; Brentwood and Islandia. We used a smartphone application as well as two dichotomous keys to identify and confirm the tree species. The Silver Maple (*Acer saccharinum)* was found to be the most dominant tree species.

**Introduction:**

Suffolk Country is surrounded by many different trees, the trees used in this study are from various residential properties on Long Island. According to (Nelson et al. 2014) the Silver Maples (*Acer saccharinum*) are a native species of North America. It is widely planted, from parks to roadsides to residential backyards and even parking lots. They usually grow in floodplains, bottomlands and river bottoms. Hence the Silver Maple (*Acer saccharinum*) is the most popular tree in Suffolk county. This tree can grow as tall as 30.50m tall and 1.50m wide. Because of their robust root system they withstand a variety of different soils. This tree can survive through floods and is able to survive some droughts. The trees in our study are found in different properties, which varied in types of soil and climate.

**Method:**

In Suffolk County there were four residential properties surveyed, three in Brentwood and one in Islandia. The survey showed that sixty-four samples of trees were taken from these four residential properties. We used the mobile application *vTree* (Peterson 2018), a smartphone application *Leafsnap* (Bellhuneurand 2016) and two dichotomous keys (Watts & Watts 1991, Watts & Watts 1998) to identify the tree species of our samples. To find the latitude and longitude of each tree we used *Earth Explorer* (USGS 2019).

**Results:**

Table 1 presents the data for latitude and longitude of all locations where trees were sampled. Table 2 shows the location of the samples, the common name and the species name, and number of each species found at the location. We found that in 68% of the trees surveyed in Islandia and 37% of the trees surveyed in Brentwood are Silver Maple. Also 63% of the total trees surveyed are Maples.

**Table 1: Different Locations of Trees**

| Town | County | Latitude | Longitude |
|---|---|---|---|
| Brentwood[1] | Suffolk | 40.7932 | -73.2568 |
| Brentwood[2] | Suffolk | 40.7689 | -73.2254 |
| Brentwood[3] | Suffolk | 40.7726 | -73.2313 |
| Islandia | Suffolk | 40.8043 | -73.1690 |

**Table 2: Identification of Trees in Brentwood and Islandia**

| Location of Samples | Common Name | Species Name | Total of each |
|---|---|---|---|
| Brentwood[1] | *Sugar Maple* | *Acer saccharum* | 1 |
| Brentwood[1] | *Japanese Maple* | *Acer palmatum* | 1 |
| Brentwood[1] | *White Mulberry* | *Morus alba* | 14 |
| Brentwood[2] | *Silver Maple* | *Acer saccharinum* | 7 |
| Brentwood[2] | *European Mountain Ash* | *Sorbus aucuparia* | 2 |
| Brentwood[2] | *Japanese Privet* | *L. ovalifolium* | 2 |
| Brentwood[3] | *Silver Maple* | *Acer saccharinum* | 10 |
| Brentwood[3] | *Pin Oak* | *Quercus palustris* | 3 |
| Brentwood[3] | *Sugar Maple* | *Acer saccharum* | 5 |
| Islandia | *Eastern Juniper* | *Juniperus virginiana* | 3 |
| Islandia | *Norway Maple* | *Acer platanoides* | 3 |
| Islandia | *Silver Maple* | *Acer saccharinum* | 13 |

**Discussion:**

The Silver Maple (*Acer saccharinum)* was identified on each of the properties that we sampled. There were 36 out of 64 trees surveyed from Brentwood and Islandia that were Silver Maple (*Acer saccharinum)*. According to a study from Tal et al. (2014) they found that the Silver Maple was a dominant tree in six residential properties located in Brentwood, Huntington and Deer Park. In another study from *Orto et al.(2017) they reported* that the Silver Maple tree was the dominant in four residential properties from Deer Park and Brentwood.

**Conclusion:**

Silver Maples trees are the dominating trees in our samples (47%), and possibly across Suffolk County, which is consistent with what is found in previous literature. From our study we found that forty trees out of sixty-four (63%) were Maple trees therefore making up most of the tree population and adds to the existing body of literature surveying common tree species on Long Island. New York.

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# Flying with Swallows – Building a Dietary Profile for the American Cliff Swallow Using DNA Barcoding

**Authors:** Dante Ayala and Joanna Werner-Fraczek

**Keywords:** Biology, Cliff Swallow, DNA Barcoding

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**Abstract:**

Every year, Moreno Valley College in Southern California is host to the seasonal residence of the American cliff swallows, *Petrochelidon pyrrhonota*. They build multiple nests around campus, utilizing the nearby lake as a water source, and the surrounding hills as a mud source for their nests; they are insectivores feeding on insects flying in swarms. Biology students have monitored the diet of the cliff swallows. DNA barcoding technique is used to analyze the stomach contents of the birds once found deceased on campus. Results show that flying fire ants, western drywood flying termites and scentless weed bugs compose the main basis for the diet of the swallows in the MVC surroundings at the time the studies were conducted. The college's ongoing research with the swallows and their diet contributes to our understanding of the cliff swallow as a migratory bird and a model organism for biomonitoring common pests.

**Introduction:**

During late winter, and early spring, the American cliff swallow begins to arrive to the continental United States from their winter habitat in the southern hemisphere. The swallows return to North America to breed and rear their young, and have consistently stopped in Southern California, and subsequently, Moreno Valley College (MVC) using the stucco walls of the campus for the nesting site. The presence of the birds initiated the study of monitoring the swallow population on campus, and investigations of the swallow's diet through molecular biology tools to analyze the swallow's role as a natural regulator of insect pests and invasive species. Scientific literature regarding the profiling and cataloging of the diet of *Petrochelidon pyrrhonota* is sparse, however their role as insectivores is well documented and guided the inquiry of the research performed by *Flying with Swallows.*

Figure 1: Showing a swallow dissection in order to extract insect fragments.

**Materials and Methods:**

During the 2017 breeding season, seven swallow chicks were found deceased on campus that died between May 11, and June 21, 2017. Stomach contents of swallow chicks were extracted via dissection and individual pieces were isolated with aid of a dissection microscope. DNA was isolated using Qiagen's Stool Isolation Kit. The samples were then subjected to PCR to amplify the targeted Catechol Oxidase 1 mitochondrial gene using Folmer primers. The primer set LCO1490 and HCO2198 amplify a 658 bp fragment of the COI gene in a wide range of invertebrate taxa. The following primer sequences were used to amplify DNA of the obtained samples LCO1490: 5'-GGTCAACAAATCATAAAGATATTGG-3' and HCO2198: 5'-TAAACTTCAGGGTGACCAAAAAATCA-3'. PCR was performed by initial denaturation at 94° C for three minutes, followed by 35 cycles of 95° C for 45 seconds, 42° C for 45 seconds, and one minute at 72° C, followed by a final extension step at 72° C for seven minutes. Purification of DNA from an agarose gel was performed using Qiagen's Gel Purification Kit, and samples were sent for sequencing. The bioinformatics software, FinchTV, was used to visualize and clean the resulting chromatogram. The final product was put into NCBI's BLAST to identify insect species. For samples where the insect fragment was sufficiently intact, a photograph of the sample was taken to aid in confirming the insect species identified by the NCBI BLAST tool.

Figure 2: An insect fragment photographed during extraction and prior to isolation for DNA barcoding.

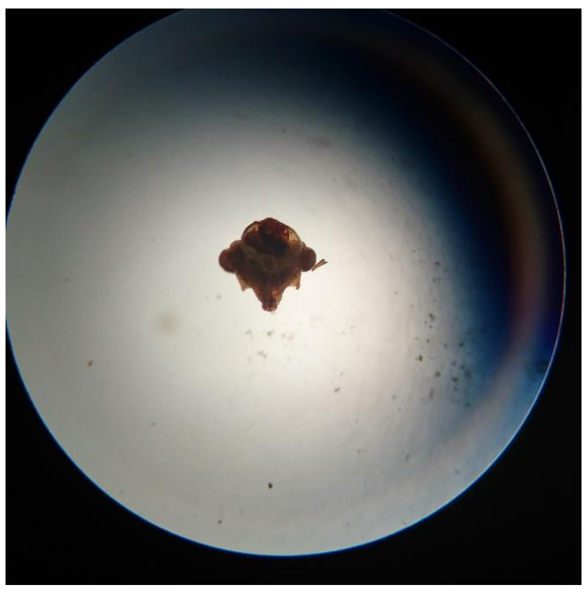
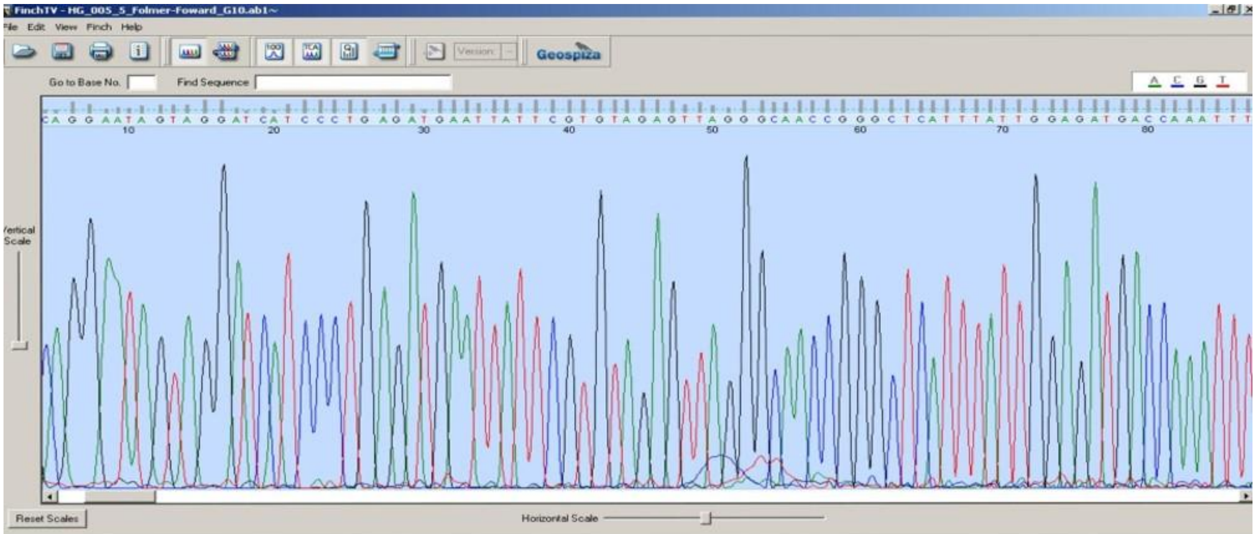


Figure 3: The resultant chromatogram identifying *A. crassus* as an insect found within the stomachs of swallow chicks recovered at MVC.




| Description | Max score | Total score | Query cover | E value | Ident | Accession |
|---|---|---|---|---|---|---|
| Arhyssus crassus voucher CCDB-21314-F12 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial | 1168 | 1168 | 95% | 0.0 | 100% | KR031836.1 |
| Arhyssus crassus voucher CCDB-21314-F11 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial | 1162 | 1162 | 95% | 0.0 | 99% | KR031646.1 |
| Arhyssus scutatus voucher CNC#HEM301348 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial | 1157 | 1157 | 95% | 0.0 | 99% | KR042598.1 |
| Arhyssus scutatus voucher CNC#HEM300467 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial | 1134 | 1134 | 95% | 0.0 | 99% | KR039690.1 |
| Arhyssus scutatus voucher CNC-HEM-1264 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial | 1105 | 1105 | 92% | 0.0 | 99% | HQ105448.1 |
| Arhyssus scutatus voucher CNC-HEM-1265 cytochrome oxidase subunit 1 (COI) gene, partial cds; mitochondrial | 1101 | 1101 | 92% | 0.0 | 99% | HQ105449.1 |

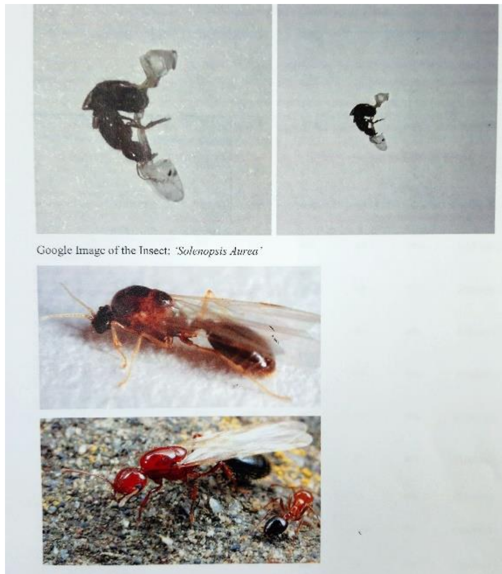
**Results:**

Three insect species have been identified in the swallows' diet samples harvested between May 11 and June 21, 2017: *Solenopsis aurea*, a species of fire ant in Southern California, *Incisitermes minor*, the western drywood termite, and *Arhyssus crassus,* the scentless weed bug.

**Discussion:**

Collaboration by the General Biology (BIO-1) and Introduction to Cell and Molecular Biology (BIO 60/11) courses at Moreno Valley College towards cataloging the flying insect species around the campus has provided a useful reference frame for the inquiry into which of these insects the resident cliff swallows feed on. Three significant insect pest species were successfully identified, supporting the swallows' role as insectivores that regulate populations of insects considered pests directly to humans and indirectly as pests to agriculture. Because the frequency of naturally deceased swallows increases in the latter months of the nesting season, it is unclear whether the insects that were identified are a staple of the swallows' diet throughout the nesting season or only within the warmer months at the end of their nesting season.

Figure 4: A photographic comparison of an ant collected on MVC's campus by a BIO-11/60 student prior to DNA barcoding, and the google search of the resulting species provided by NCBI's.




The behavior of the Cliff Swallow to hunt on the wing means its diet at least partially consists of the insect populations that fly in a particular time of the year. The nesting season of the cliff swallows, from February to June, coincides with the swarming times of several insect species in the area, including *Incisitermes minor,* and *Solenopsis aurea.* Fire ants in the genus *Solenopsis* fly during their mating rituals, which typically take place within 24 hours of a rain. Although they can occur at any point of the year, the mating flights of fire ants are likely to occur during Southern California's cold and wet early spring. It is unclear whether or not the species of fire ants identified within the stomachs of the swallows collected for analysis are among an exotic species of fire ants. *Flying with* Swallows maintains a collaborative relationship with Dr. Purcell of the Entomology department of the University of California Riverside (UCR) to address this question. *Incisitermes minor*, the western drywood termite also swarms for the purpose of mating and establishing new colonies. It is typically known to swarm in the months of October and November; however, they have been observed swarming as early as May in warm desert areas such as Palm Springs, California. Due to the proximity of Palm Springs to Moreno Valley, and the similar climate and habitat availability, it is not unlikely that swarms of *I. minor* would coincide with the cliff swallows' residence at Moreno Valley College. Very little information is available on the life cycle and life history traits of *Arhyssus crassus,* however they are known to be active and feeding on weedy plants in the warm temperatures of spring and summer and is quite possible that they account for part of the cliff swallows' diet during the warmer months of their residency at the college.

*Flying with Swallows* is also investigating into the where the MVC cliff swallows feed. The different populations of insects present on campus have been previously cataloged by the students in BIO-1 and BIO-60/11 classes. An ongoing collaboration with UCR's Dr. Erin Rankin hopes to develop a more efficient tool of cataloging the diet of the MVC resident cliff swallows by meta-barcoding of the genetic content of the swallows' droppings. We hope to find evidence that may suggest where the swallows do most of their feeding by a comparison analysis of these two data sets.

Analysis on DNA yield revealed that our isolation efficiency was low. It is suspected that the nature of the isolated samples, being partially digested at the time of extraction, compromises the DNA within the insect fragments. We plan on continuing our study into the diet of the swallows. Ongoing efforts include developing new methods of improving DNA yield.

All studies are ongoing.

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# Non-Native Trees are Dominant to Native Trees along the North and South Shores of Long Island NY

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**Key Words:** Native, North Shore, South Shore, Long Island

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**Abstract:**

Twelve different species of trees were identified among forty trees surveyed on residential properties of West Babylon, Kings Park, and Lindenhurst. In order to identify tree species in this study, dichotomous keys were used. There were two Chinese Elm, eight White Oak and two Flowering Dogwood trees found on the North Shore. On the South Shore there was one Pin cherry tree, three Balsam Poplar, six White Mulberry, two Arizona Sycamore, two Balm of Gilead, three American Beech, seven Black Maple, two Gambel Oak, and two Atlantic White Cedar. Seventy five percent of these trees are non-native and twenty five percent of the trees are native.

**Introduction:**

This study was done to identify the tree species in three towns in Suffolk County, NY, Kings Park, Lindenhurst, and West Babylon. These three towns have such a variety of similar and different tree species. Both Lindenhurst and West Babylon are located on the South Shore, and Kings Park is on the North Shore. The soil on the South Shore is sandy and on the North Shore the soil is rocky (Monti 2007). Due to the northeastern region having such dramatic climate changes, the variety of different species is much more unique compared to that of different parts of the United States (Preszler 2013). On the South Shore of Long Island, the Atlantic Ocean helps cools the heat in the warmer months. The North Shore has hot and humid summers and very cold winters.

**Method:**

We surveyed the trees of four residential properties in the towns of Kings Park, Lindenhurst, and West Babylon in New York. The species were identified using two dichotomous keys; Peterson Field Guides for Eastern Trees (Pedrides & Wehr 1988) and Tree Finder (Watts 1998). We used Google Maps (Google Corp.2019) to determine the coordinates of each location surveyed.

**Results:**

Below are the results from our native and non-native trees from each property surveyed. The coordinates of the properties from West Babylon, Lindenhurst, and Kings Park are listed on Table 1. Each residential area varied with the amount of trees on each property which is listed on Table 1.

Table 1: Location and Amount of Trees Surveyed

| Town | West Babylon | West Babylon | Lindenhurst | Kings Park |
|---|---|---|---|---|
| Latitude Longitude | Latitude- 40.703381 Longitude- 73.355248 | Latitude- 40.72690 Longitude- 73.371665 | Latitude- 40.676775 Longitude- 73.36159 | Latitude- 40.879846 Longitude- 73.263866 |
| Square Meters | 929.0304 square meters | 812.9016 square meters | 464.5152 square meters | 1052.12693 square meters |
| # Of Trees | 12 Trees | 10 Trees | 8 Trees | 10 Trees |

The second part of our results consists of the type of trees found from each residential property. We identified which trees are native and non-native.

Table 2: Tree Analysis

| Tree Type | *Scientific name* | Native or Non-Native | Quantity | Location | Percentage |
|---|---|---|---|---|---|
| Pin Cherry | *Prunus pensylvanica* | Non-Native | 1 | West Babylon | 2.5% |
| Gambale Oak | *Quercus gambelii* | Non-Native | 2 | West Babylon | 5% |
| Arizona Sycamore | *Paltanus wrightii* | Non-Native | 2 | West Babylon | 5% |
| Balsam Poplar | *Populus balsamifera* | Non-Native | 3 | West Babylon | 7.5% |
| White Mulberry | *Morus alba* | Non-Native | 6 | West Babylon | 15% |
| Black Maple | *Acer nigrum* | Non-Native | 7 | West Babylon | 17.5% |
| Atlantic White Cedar | *Chamaecyparis thyoides* | Non-Native | 2 | Lindenhurst | 5% |
| Balm of Gilead | *Populus balsamifera* | Non-Native | 2 | Lindenhurst | 5% |
| American Beach | *Fagus grandifolia* | Non Native | 3 | Lindenhurst | 7.5% |

| | | | | | |
|---|---|---|---|---|---|
| Chinese Elm | *Ulmus parvifolia* | Non-Native | 2 | Kings Park | 5% |
| Flowering Dogwood | *Cornus florida* | Native | 2 | Kings Park | 5% |
| White Oak | *Ouercus alba* | Native | 8 | Kings Park | 20% |

**Discussion:**

In the study, we found that only two species, the Flowering Dogwood (*Cronus florida*) and White Oak (*Quercus alba*) are native to Long Island on the residential properties surveyed. The rest of the species found are non-native to Long Island. Yodice, et al. (2017) surveyed similar towns as us which consisted of West Babylon and Lindenhurst. It appears that there are three native trees in their data, White Ash (*Fraxinus americana*), Green Ash (*Fraxinus*), and Longleaf Pine (*Pinus palustris*). The rest of the trees in their data are non-native to Long Island. Seventy-eight percent of their trees are non-native; twenty-two percent of their trees are native. The most common species they found, were the Douglas Firs (*Pseudotsuga menziesii),* and the Longleaf Pine (*Pinus palustris)* which both were twelve percent of their species found.

**Conclusion:**

The areas we surveyed were West Babylon, Lindenhurst and Kings Park. We identified twelve different species of trees which were Pincherry (*Prunus pensylvanica*), Balsam Poplar (*Populus balsamifera*), White Mulberry (*Morus alba)*, Chinese Elm (*Ulmus parvifolia*), White Oak (*Quercus alba*), Arizona Sycamore (*Platanus wrightii*), Balm of Gilead (*Populus balsamifera L. subsp. balsamifera)*, American Beech (*Fagus grandifolia)*, Black Maple (*Acer nigrum*), Gambel Oak (*Quercus gambelii*), Atlantic White Cedar (*Chamaecyparis thyoides*), and Flowering Dogwood (*Cornus florida*). Of the different species we identified only two were found to be native to Long Island, they were the Flowering Dogwood (*Cornus florida*), and the White Oak (*Quercus alba).* The most common species we found was the White Oak (*Quercus alba)*. Twenty percent of the trees we identified were White Oak. Out of forty trees, seventy-five percent of the trees are non-native to Long Island, and twenty five percent of the trees are native to Long Island.

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# White Ash and Sugar Maple are Codominant Species, while Japanese Angelica is Invasive within Bayview Park in Mastic Beach, NY

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**Keywords:** White Ashe, Sugar Maple, Japanese Angelica, Invasive, Mastic Beach

**Abstract:**

A total of 47 tree samples from three sections of Bayview Park were collected and analyzed using two different dichotomous keys to identify species. It was found that each section had its own dominant species and that an invasive species was present. The dominant species were Sugar Maple (*Acer saccharum*) in the northeast section. In the southwest section, the dominant species was White Ash (*Fraxinus americana*), and in the northwest section, the dominant species was Cedar Elm (*Ulmus crassifolia*). The invasive species Japanese Angelica (*Aralia elata*) was located outside of the sections at the northern periphery of the park.

**Introduction:**

Taking an ecological survey of an area in the environment can help stop the spread of invasive species as well as give researchers the ability to understand which species are dominant in a specific area. By understanding which species are dominant in addition to finding and removing invasive species, we can better protect the environment.

On October 24th, 2020, three ecological surveys were conducted in Bayview Park in Mastic Beach, New York, to determine what species were present and if there was an invasive species within the park. The nearest National Oceanic and Atmospheric Administration or (NOAA) weather station located at Brookhaven Airport recorded a yearly average high temperature of 22.8 degrees Celsius, and the yearly average low was -1.1 degrees Celsius**.** (NCEI 2010). The weather condition for the day was partly cloudy. This park is approximately 3 meters above sea level. (Cedar Lake Ventures 2016). According to our hypothesis, we predicted there would be a dominant tree species located in the park that persisted across all 3 survey locations due to the close geographical location of the survey sites and the similar environmental conditions of the 3 locations. This hypothesis was made due to limited variation in the environmental conditions present, which could affect which species would be dominant and how many different species could be successful in this environment. Additionally, Suffolk County has a humid temperature climate that's influenced by the Long Island Sound as well as the Atlantic Ocean. These bodies of water tend to temper extreme heat in summer and cold in winter. (Warner Jr. et al. 1975) This reinforced the belief that with the limited number of trees that can grow in these conditions and the small differences in the geographic location, there would be one dominant species in all 3 sections.

There were 3 surveys conducted in different park areas, which were divided into 30 square meter sections. There were 20 specimens identified in the South West (SW) section, 13 in the North East (NE) section, and 14 in the South East (SE) section. These surveys utilized two different dichotomous keys, which were used to identify the tree species. A dichotomous key is defined as "a tool created by scientists to help scientists and laypeople identify objects and organisms. Typically, a dichotomous key for identifying a particular object's species consists of a specific series of questions. When one question is answered, the key directs the user as to what question to ask next. Dichotomous keys typically stress identifying species by their scientific name, as each individual species has a unique scientific name." (BD Editors 2019) After using the dichotomous key, the trees were identified and compared in quantity by section, including the ability to identify non-native and invasive species.

**Methods:**

Three ecological surveys were conducted in Bayview Park Mastic Beach, New York, 11951, on October twenty-fourth, 2020. An ecological survey identifies all trees within a survey area. Each sample area was thirty square meters and measured by a 30 meter Champion Sports Open Reel Measuring Tape. (Champion Sports 2020) Once measured, GPS coordinates of each corner of the sample area were taken by utilizing an LG V40 ThinQ with the application Google Maps. (Rasmussen et al. 2020) A bright-colored string was then set into the ground with stakes connecting each corner of the survey area to ensure that the ecological survey only sampled trees within each survey area's measured perimeter. Each tree was identified utilizing 2 dichotomous keys, the first being the Arbor Day Foundation dichotomous key for trees in the United States' eastern and central regions and the second was Cornell University's "Know Your Trees" dichotomous key. (The Arbor Day Foundation 2020, Cope et al. 2002) Following this the tree circumference was then measured by a 30 meter Champion Sports Open Reel Measuring Tape. (Champion Sports 2020) This data was recorded in the application Google Sheets, and tables were then compiled from this information to compare each sample location to each other and other ecological surveys. The Chi-Square Test of Independence was then performed to test whether White Ash (*Fraxinus americana)* and Sugar Maple (*Acer saccharum)* are homogeneously distributed in the survey areas.

**Results:**

This ecological survey found that White Ash (*Fraxinus americana*) was the dominant species in Bayview Park, but the majority of this species came from survey site NE, which consisted of 100% White Ash. It was also found that each sample location had a different dominant species, that varied with sample location. While Sugar Maple (*Acer saccharum)* is the dominant species as 60% of the SW site, sample location NE consisted exclusively of White Ash (*Fraxinus americana*) and, sample location SE had Cedar Elm (*Ulmus crassifolia*) as the dominant species at 35.71% of the sample. After the ecological survey was completed, it was found that near sample site SE was twelve instances of the invasive species Japanese Angelica (*Aralia elata*) at latitude 40.761073 and longitude -72.851217. This species is described by the Pennsylvania Department of Conservation and Natural Resources by stating**,** "Where observed, this species acts more aggressively than the native *A. spinosa,* replacing other native vegetation and reducing biodiversity" (Pennsylvania Department of Conservation and Natural Resources n.d.) Of the species identified in this ecological survey three were native (*Acer saccharum, Fraxinus americana, Ulmus crassifolia)* (Godman et al. n.d, Gilman & Watson 1993, Weldy et al. 2020) and two were naturalized and non-invasive (*Acer pseudoplatanus, Ilex opaca*). (Weldy et al. 2020, United States Department of Agriculture. n.d.) Image 1 below shows a map of the approximate location of the survey locations and is reproduced and annotated with the permission of Google Maps. (Rasmussen et al. 2020). Table 1 contains cumulative data of all three survey locations. Table 2A below shows the Latitude and Longitude of the four corners of the SW survey site, and Table 2B below shows the collected data for survey site SW.

**Table 2A:** Latitude and Longitude of the four corners of survey site SW

| Site SW | Latitude | Longitude |
|---|---|---|
| Corner 1 | 40.761363 | -72.85203 |
| Corner 2 | 40.761208 | -72.851979 |
| Corner 3 | 40.761175 | -72.852282 |
| Corner 4 | 40.761289 | -72.852249 |

Table 3A below shows the Latitude and Longitude of the four corners of survey site NE, and table 3B below shows the collected data for survey site NE.

**Table 3A:** Latitude and Longitude of the four corners of survey site NE

| Site NE | Latitude | Longitude |
|---|---|---|
| Corner 1 | 40.761634 | -72.851401 |
| Corner 2 | 40.76184 | -72.851452 |
| Corner 3 | 40.761793 | -72.851589 |
| Corner 4 | 40.761633 | -72.851576 |

Table 4A below shows the Latitude and Longitude of the four corners of survey site SE, and table 4B below shows the collected data for survey site SE.

**Table 4A:** Latitude and Longitude of the four corners of survey site SE

| Site SE | Latitude | Longitude |
|---|---|---|
| Corner 1 | 40.761412 | -72.85141 |
| Corner 2 | 40.76144 | -72.851213 |
| Corner 3 | 40.761258 | -72.851385 |
| Corner 4 | 40.761278 | -72.851197 |

**Figure 1:** Map of Bayview Park annotated to show the location of the three survey sites.


(Image is reproduced and annotated with the permission of Google Maps.)

**Table 1:** Tree species concentration and average circumferences for Bayview Park

| Name | Number and % concentration | Average Circumference (m) |
|---|---|---|
| Sugar Maple (*Acer saccharum*) | 15 31.91% | 59.7 |
| Sycamore maple (*Acer pseudoplatanus*) | 1 2.13% | 66 |
| White Ash (*Fraxinus americana*) | 19 40.43% | 64.2 |
| American Holly (Ilex opaca) | 3 6.38% | 10.7 |
| Cedar Elm (*Ulmus crassifolia*) | 9 19.15 | 59.5 |

**Table 2B:** Tree species concentration and average circumferences for site SW

| Name | Number and % concentration | Average Circumference (m) |
|---|---|---|
| Sugar Maple (*Acer saccharum*) | 12 60% | 49.9 |

| | | |
|---|---|---|
| Sycamore maple (*Acer pseudoplatanus*) | 1 5% | 66 |
| White Ash (*Fraxinus americana*) | 3 15% | 57.8 |
| Cedar Elm (*Ulmus crassifolia*) | 4 20% | 68.5 |

**Table 3C:** Tree species concentration and average circumferences for site NE

| Name | Number and % concentration | Average Circumference (m) |
|---|---|---|
| White Ash (*Fraxinus americana*) | 13 100% | 60.8 |

**Table 4D:** Tree species concentration and average circumferences for site SE

| Name | Number and % concentration | Average Circumference (m) |
|---|---|---|
| Sugar Maple (*Acer saccharum*) | 3 21.43% | 89.7 |
| White Ash *(Fraxinus americana*) | 3 21.43% | 85.5 |
| American Holly (*Ilex opaca*) | 3 21.43% | 10.7 |
| Cedar Elm (*Ulmus crassifolia*) | 5 35.71% | 58.5 |

By utilizing the Chi-Square Test of Independence, it was determined whether White Ash (*Fraxinus americana)* and Sugar Maple (*Acer saccharum)* are homogeneously distributed in the two survey sites which had the greatest variation in species concentration. Table 5 below shows the data which was compared during the Chi-Square Test of Independence.

**Table 5:**Chi-Square Test of Independence

| Chi-Square Test of Independence | Survey site SW | Survey site NE |
|---|---|---|
| Sugar Maple (*Acer saccharum*) | 12 (a) | 0 (b) |
| White Ash *(Fraxinus americana*) | 3 (c) | 13 (d) |

This test was conducted utilizing the formula, $((ad-bc)^2*(a+b+c+d))/((a+b)*(c+d)*(b+d)*(a+c))$ which resulted in a Chi-square critical value of 18.2. This value results in a p-value of .000112 or 0.0112% which means this variation is statistically significant to the one-one hundredth of one percent level of probability.

**Discussion:**

In this survey, *Acer saccharum* and *Fraxinus americana* were discovered to be most prominent. This is consistent with reporting by Riemann et al. (2014) at the United States Department of Agriculture, which states these species are prevalent throughout Long Island, NY. When comparing our research to similar ecological surveys such as that by Kyle Pearce, we found that *Acer saccharum* and *Fraxinus americana,* which were prevalent in our surveys, are native species throughout Long Island. 47 tree samples were identified in this study, and of those, 15 were *Acer saccharum,* and 19 were *Fraxinus americana*. In this study it was found that these species are present in the southeast of Long Island where this survey was performed. Prior research such as that conducted by Gilman et al. (1993) indicated that *Fraxinus americana* might be present at Bayview Park in Mastic Beach because they tend to grow in moist locations. According to New York Invasive Species Information and Cornell University Cooperative Extension, *Fraxinus americana* is one of the most common species in New

York State. When comparing this study to the research of Victoria Ferry of Suffolk County Community College (2019), it was found that only 9% of their identified trees in Sunken Meadow State Park were *Fraxinus americana*. This is compared to our research which shows 40.43 % of the same species. In a study conducted by Sidra Naru (2019) of Suffolk County Community College, 5 *Fraxinus americana* were found in Bay Shore, New York. This correlates to this survey's findings because it shows how *Fraxinus americana* is commonly found on the south shore of Long island. Hightshoe (1988) reports.

In a separate study conducted by Crystal Janke et al. (2019) of Suffolk County Community College, only one *Acer saccharum* was identified in North Lindenhurst. Comparing this study to the survey we performed in Bayview Park in Mastic Beach, a higher concentration of *Acer saccharum* was identified. Burak Bilbay et al. (2019) of Suffolk County Community College found that *Acer saccharum* is also found in Brentwood. Previous research by Moran (2005) says *Acer saccharum* is on the west and east, showing it grows all over Long Island, which correlates to the findings of this survey because this survey shows that *Acer saccharum* is on the north shore and also the western and eastern ends of the Island.

**Conclusion:**

In section SW, the dominant species found was the Sugar Maple (*Acer saccharum)*. In section NE, the dominant species found was the White Ash (*Fraxinus americana)*. In section C, no statistically dominant species was found. The Chi-Square Test of Independence conducted resulted in our original hypothesis being disproven as there were statistically different dominant species present in sections SW and NE. The tree species within Bayview park were found to not be evenly distributed. Additionally, there was no parkwide dominant tree species. Additionally, 12 trees of an invasive species called Japanese Angelica, (*Aralia elata)* were discovered after the survey concluded. These trees were outside of any of the ecological survey locations at the park's outermost section at the coordinates 40.761073, -72.851217. With all other species identified in this study being native or naturalized and non-invasive, it is imperative to remove this invasive species. Invasive species can displace native species that currently inhabit the ecosystem.

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# Effect of Invasive Tree and Bush Species in the Van Bourgondien County Park, West Babylon, NY

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**Keywords:** Lowbush Blueberry, Sassafras, Invasive species

**Abstract:**

A tree survey was conducted in the Van Bourgondien Park. In two separate areas, each containing twenty trees, the species of each tree was identified using two separate dichotomous keys. The address to this park is 606-, 662 Albin Ave., West Babylon, NY 11702. These two dichotomous keys were Vtree (Peterson 2012) and Leafsnap (Belhumeur 2015). My hypothesis is that Lowbush Blueberry (*Vaccinium angustifolium*) is inhibiting the growth rate of Sassafras (*Sassafras albidum*). I used the Chi-square test of independence to determine if my results were significantly different than expected. After completing my experiment, I have concluded that Lowland Blueberry is not inhibiting the growth rate of Sassafras in Van Bourgondien Park.

**Introduction:**

"An invasive species can be defined as an organism that is not indigenous, or native, to a particular area. Invasive species can cause great economic and environmental harm to the new area" (Rutledge et al., 2012). Invasive species can be harmful to the environment. They out-compete native species for resources in a specific area. They also have the benefit of not having insects or animals use them for a nest or a source of food because the insects or animals are not used to them. The negative impact of invasive species on Long Island led us to do an experiment in Van Bourgondien Park to test if the Lowbush Blueberry is an invasive species. Van Bourgondien Country Park is located in West Babylon, NY. The elevation above sea level is 11.8872 meters. The latitude and longitude points are 40°43′05″ N 73°21′15″ W (Date and Time Info 2011). According to the November 2019 - October 2020 annual weather summary, this location is above normal for all seasons (Old Farmer's Almanac 2020). The dimensions used for the two areas are 6.096 meters by 6.096 meters. I chose this location because it has a large amount of Lowbush Blueberry. One measure to determine the impact of an invasive species is by measuring the circumference of each tree in a designated area. This can determine if the invasive species is inhibiting growth. This led me to the hypothesis that the Lowbush Blueberry is an invasive species.

**Methods**:

In Van Bourgondien County Park, West Babylon, N.Y., data on trees and bushes in the area were collected. The area surveyed in Van Bourgondien County Park was a small, wooded area located behind the soccer field. Each species was identified by using Vtree (Peterson 2012) and Leafsnap (Belhumeur 2015), two types of dichotomous keys. A tape measure was used to determine the circumference of each tree. The chi-square test of independence was used to determine if the data supported my hypothesis. The equation is $x^2=((ad-bc)^2(a+b+c+d)) \div ((a+b)(c+d)(b+d)(a+c))$. For reference within the equation, "a" represents Sassafras (*Sassafras albidum*) below the average circumference in area one, "b" represents Sassafras (*Sassafras albidum*) below the average circumference in area 2, "c" represents Sassafras (*Sassafras albidum*) above the average circumference in area 1 and "d" represents Sassafras (*Sassafras albidum*) above the average circumference in area 2.

Sassafras was found growing without Lowbush Blueberry in area 1 and was found growing with Lowland Blueberry in area 2.

**Results:**

**Table 1: Results of trees in area 1**

| Common Name | Scientific name | Circumference of tree |
|---|---|---|
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 7.62 cm |
| Sassafras | *Sassafras albidum* | 7.62 cm |
| Sassafras | *Sassafras albidum* | 10.16 cm |
| Sassafras | *Sassafras albidum* | 10.16 cm |
| Sassafras | *Sassafras albidum* | 15.24 cm |
| Sassafras | *Sassafras albidum* | 15.24 cm |
| Sassafras | *Sassafras albidum* | 15.24 cm |
| Sassafras | *Sassafras albidum* | 17.78 cm |
| Sassafras | *Sassafras albidum* | 20.32 cm |
| Sassafras | *Sassafras albidum* | 35.56 cm |
| Sassafras | *Sassafras albidum* | 43.19 cm |
| Sassafras | *Sassafras albidum* | 50.8 cm |
| Sassafras | *Sassafras albidum* | 55.88 cm |
| Viburnum | *Prunus tinus* | 17.78 cm |
| Viburnum | *Prunus tinus* | 22.86 cm |
| Black Oak | *Quercus velutina* | 76.2 cm |

**Table 2: Results of trees in area 2**

| Common Name | Scientific name | Circumference of tree |
|---|---|---|
| Black Oak | *Quercus velutina* | 124.46 cm |
| Sassafras | *Sassafras albidum* | 2.794 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 5.08 cm |
| Sassafras | *Sassafras albidum* | 6.35 cm |
| Sassafras | *Sassafras albidum* | 6.35 cm |
| Sassafras | *Sassafras albidum* | 7.366 cm |
| Sassafras | *Sassafras albidum* | 7.62 cm |
| Sassafras | *Sassafras albidum* | 8.128 cm |
| Sassafras | *Sassafras albidum* | 17.272 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
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| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |

| | | |
|---|---|---|
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |
| Lowbush Blueberry | *Vaccinium angustifolium* | 0.254 cm |

**Table 3- Chi-squared Test of Independence**

| | Area 1 | Area 2 |
|---|---|---|
| Sassafras (*Sassafras albidum*) below the average length of circumference | 10 | 9 |
| Sassafras (*Sassafras albidum*) above the average length of circumference | 5 | 4 |

In area one, Sassafras (*Sassafras albidum*) had a variety of circumferences within the 15 Sassafras plants that were measured. The circumferences measured are two measurements of 5.08 cm, two measurements of 7.62, two measurements of 10.16, three measurements of 15.24 cm, 17.78 cm, 20.32 cm, 35.56 cm, 43.19 cm, 50.8 cm and 55.88 cm. Viburnum (*Prunus tinus*) had circumferences of 17.78 cm and 22.86 cm**.** Black oak (*Quercus velutina*) had a circumference of 76.2cm.

In area two, Sassafras (*Sassafras albidum*) had a variety of circumferences. The circumferences measured are 2.794 cm, six 5.08 cm, two 6.35 cm, 7.366 cm, 7.62 cm, 8.128cm, and 17.272 cm. The Black Oak (*Quercus velutina*) had a circumference of 124.46 cm. Lowbush Blueberry (*Vaccinium angustifolium*) were all measured and recorded as 0.254 cm. The probability value calculated from the chi-square test of independence is 0.0209926526. The results of my test of independence were between 0.90 and 0.80 indicating no significance. In conclusion, since there was no significance in the circumference between the Sassafras in the two areas. The Lowbush Blueberry does not appear to be affecting its growth rate of Sassafras (*Sassafras albidum*).

**Discussion:**

Comparing the study by Chiuchiolo (2018) to my own, I have noticed that there are similar plants to be compared to Lowbush Blueberry (*Vaccinium angustifolium*). The plant that is comparable to Lowbush Blueberry (*Vaccinium angustifolium*) is the Norway Maple. In my study, I had concluded that Lowbush Blueberry (*Vaccinium angustifolium*) was not invasive towards Sassafras (*Sassafras albidum*) opposed to the Norway Maple plant which is considered to be an invasive plant on Long Island (Chiuchiolo et al.2018). According to the study by Lizarraga (2014), who studied the trees in the Town of Babylon, Maple trees are found to be a dominant species. My experiment and Lizarraga both tested species within the Town of Babylon. (Lizarraga et al.2014). A study by Dooling et al. (2014), found that Sassafras (*Sassafras albidum*) is native to Long Island. This would explain the large amount of Sassafras (*Sassafras albidum*) found in my study (Dooling et al.2014). One limitation of my study is to get an accurate indication of the impact that an invasive species has on an area, I would need to take several measurements over a longer period.

**Conclusions:**

Based on my experiment, I have concluded that the Lowbush Blueberry (*Vaccinium angustifolium*) is not affecting the growth rate of Sassafras (*Sassafras albidum*) in Van Bourgondien Park.

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# Investigating the Prevalence of Non-native vs Native Tree Species on Long Island

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**Keywords:** Species, Native, Non Native, Suffolk

**Abstract:**

A total of 45 tree branch specimens were sampled from Long Island, New York residences at Amityville, Deer Park, West Babylon and Stony Brook. The tree specimen samples were identified using 6 dichotomous keys. The data collected showed that native trees are dominant to non-native trees in the areas surveyed.

**Introduction:**

The tree species were sampled from four Long Island locations; Amityville, Deer Park, West Babylon, and Stony Brook. The average temperature in April in Suffolk County NY is 16 degrees Celsius to 5 degrees Celsius (National Oceanic and Atmospheric Administration, 2020). According to The Old Farmer's Almanac, founded in 1792 Suffolk County experienced a mean wind speed of 13 km per hour (kph), a maximum sustained wind speed of 27.8 kph, and a maximum wind gust of 31.7 kph. There was a mean sea level pressure of 75.1 cm a mean dew point of 2.056 degrees Celsius and a visibility of 16.1 km.

**Method:**

A total of 45 tree specimen samples were collected from four Long Island residences. The students identified the specimen samples in the lab using dichotomous keys (Watts and Watts 1970) and were asked to confirm the specimen identification using a second dichotomous key (Petrides and Wehr 1998). After the specimen identification was confirmed, students wrote down the scientific names of the tree species and its quantity, and identified the location of each property using Earth Explorer (2018). The Vtree finder (2004) provided the data for each location's elevation.

**Results:**

After the 45 samples were collected from the 4 different locations in Suffolk, Long island our data showed that 62% of all the sampled trees were non-native, therefore non-native trees are the dominant species in the sampled section on Long Island. This data is represented below by two tables.

**Table 1: Location of Each Tree Samples**

| | Location 1 | Location 2 | Location 3 | Location 4 |
|---|---|---|---|---|
| **Towns** | **Amityville** | **Deer Park** | **West Babylon** | **Stony Brook** |
| **Coordinates** | **Latitude:** 40.6744 **Longitude:** 40.6744 **Elevation:** 5.0 | **Latitude:** 40.7744 **Longitude:** -73.3269 **Elevation:** 76.0 | **Latitude:** 40.7284 **Longitude:** -73.3486 **Elevation:** 42.0 | **Latitude:** 40.8994 **Longitude:** -73.1070 **Elevation:** 145.0 |
| **Total Trees** | 6 | 17 | 15 | 7 |

**Table 2: Result of Identified Trees**

| Tree Type (Scientific name) | Quantity | Location | Native or Non-native |
|---|---|---|---|
| **Black Spruce (*Picea mariana)*** | **2** | **Stony Brook** | **Native** |
| **Red Maple (*Acer rubrum)*** | **2** | **Stony Brook** | **Native** |
| **Silver Maple (*Acer saccharinum)*** | **3** | **Stony Brook** | **Native** |
| **Northern White Cedar (*Thuja occidentalis*)** | **3** | **Amityville** | **Non-native** |
| **Common Elderberry *(Sambucus nigra)*** | **3** | **Amityville** | **Native** |
| **Celastraceae *(Euonymus japonicus)*** | **1** | **West Babylon** | **Non-native** |
| **Hazel Pine *(Liquidambar styraciflua)*** | **3** | **West Babylon** | **Non-native** |
| **Forest Apple (*Malus sylvestris)*** | **2** | **West Babylon** | **Non-native** |
| **HoneySuckle (*Lonicera tatarica)*** | **3** | **West Babylon** | **Non-native** |
| **Boxwood (*Buxus sempervirens)*** | **2** | **West Babylon** | **Non-native** |
| **Common yew (*Taxus baccata)*** | **1** | **West Babylon** | **Non-native** |
| **Red Twig Dogwood *(Cornus sericea)*** | **1** | **West Babylon** | **Native** |
| **Burning Bush *(Euonymus alatus)*** | **1** | **West Babylon** | **Non-native** |
| **Great Maple *(Acer platanoides)*** | **1** | **West Babylon** | **Non-native** |

| | | | |
|---|---|---|---|
| **Chinese Bucs (*Chionanthus retusus*)** | **4** | **Deer Park** | **Non-native** |
| **Eastern Black Oak (*Quercus velutina*)** | **2** | **Deer Park** | **Native** |
| **Tulip Tree (*Liriodendron tulipifera*)** | **3** | **Deer Park** | **Native** |
| **Japanese Maple (*Acer palmatum*)** | **1** | **Deer Park** | **Non-native** |
| **Cherry Blossom, Sakura (*Prunus serrulata*)** | **6** | **Deer Park** | **Non-native** |
| **Money Tree (*Pachira aquatica)*** | **1** | **Deer Park** | **Native** |

**Discussion:**

Based on the results gathered in this study shown on table 1 and table 2, the data found that 38% of all the sampled trees were native to Long Island and 62% of all the trees sampled were not native to Long Island. A location that had the dominant native species was Stony Brook and a location that had the dominant non-native species was West Babylon.

In previous studies, investigators have found similar data supporting our research results. A study done by (Dickron et al.2019 ) showed that a large quantity of their tree sample (77 %) represented the non-native trees and 23% native. In a second comparison of the Suffolk county area, results also concluded that non-native trees were dominant to native trees (Frazier et al.2019). In a third study comparison it was found that 44% were native to the area and 68 % were non-native (Campitiello et al.2015).

**Conclusion:**

In the wake of using the dichotomous key, researchers recognized an aggregate of 45 trees in four private properties in: Amityville, Deer Park, West Babylon, and Stony brook. Our data concludes that 38% of the specimens taken from the Long Island properties were native species; Black Spruce (*Picea mariana*), Red Maple (*Acer rubrum*), Silver Maple (*Acer saccharinum*), Common Elderberry *(Sambucus nigra)*, Easter Black Oak (*Quercus velutina*), and Tulip Tree (*Liriodendron tulipifera*), Red Twig Dogwood *(Cornus sericea)* , Money Tree (*Pachira aquatica).* 62% of the species were non-native: Northern White Cedar (*Thuja occidentalis*), Celastraceae *(Euonymus japonicus),* Hazel Pine *(Liquidambar),* Forest Apple (*Malus sylvestris),* Honey Suckle (*Lonicera tatarica),* Boxwood (*Buxus Sempervirens),* Common yew (*Taxus baccata)*, Chinese Bucs (*Chionanthus retusus*), Japanese Maple (*Acer palmatum*), Cherry Blossom (Sakura) (*Prunus serrulata*), Burning Bush (*Euonymus alatus ),* Great Maple (*Acer platanoides ).*

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# Red Maple is the Dominant Tree Species in Locust Valley on the North Shore of Long Island and White Oak is found to be the Dominant Tree Species in West Islip on the South Shore of Long Island

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**Keywords:** North Shore, South Shore, Long Island, New York

**Abstract:**

Forty-seven trees were surveyed from two residential properties in Suffolk County, NY and one residential property in Nassau County, NY. The trees species were identified by using a dichotomous key. Red Maple trees were dominant in Locust Valley, Nassau County, NY, and 51% of the samples that were identified were Red Maple. White Oak trees were found to be the dominant tree species in West Islip (71%).

**Introduction:**

Taxonomy is the study that classifies all living things. It was developed by the Swedish botanist Carolus Linnaeus (Buckley 2017). Linnaeus invented binomial nomenclature, in which two terms are used to denote a species of living organism, the first one indicating the genus and the second the specific species (Buckley 2017). A dichotomous key is a book that is used to identify trees, shrubs and other plants that are native to the area. This study was conducted on one residential property in Locust Valley, Nassau County, NY and two residential properties in West Islip Suffolk County, NY to see the variety of tree species that grow in these areas. Long Island temperatures in November average 3.33 C□ (The National Climate Data Center 2016). Locust Valley's sea elevation is 14.0 meter (National Centers for Environmental Information 2019). West Islip's sea elevation is 14.0 meters (National Centers for Environmental Information 2019). Locust Valley has an average annual temperature of 12.2°C (The National Climate Data Center 2016). West Islip has an average annual temperature of 12.2°C (The National Climate Data Center 2016). Locust Valley's average annual rainfall is 46.4 inches (National Centers for Environmental Information 2019). West Islip's average annual rainfall is 45.0 inches (National Centers for Environmental Information 2019). The national average rainfall is 38.1 inches (National Centers for Environmental Information 2019).

**Methods:**

A total of forty-seven tree samples, which had at least three leaves on them, were collected from Locust Valley, NY and West Islip, NY. Samples were identified using a dichotomous key (Watts and Watts 1998). Lastly, the data of the coordinates as well as the average annual rainfall and elevation from sea level were found using Earth Explorer (USGS 2018).

**Results:**

After collecting 47 tree samples, it was found that in Locust Valley, NY Red Maple Trees comprised 51% of the trees surveyed. No Red Maples were found at the locations surveyed in West Islip. Table 1 shows latitude and longitude coordinates of the locations and the lot size of the properties where samples were collected. The trees species found at the Locust Valley location that were identified are: 6 Atlantic White Cedar (*Chamaecyparis thyoides),* 10 Sugar Maple (*Acer saccharum),* and 24 Red Maple (*Acer Rubrum)* (Table 2). At the two West Islip locations the trees species identified were: 5 White Oak (*Quercus phellos),* 1 Rough Leaf Dogwood (*Cornus Drummondii),* and 1 Red Dogwood (*Cornus Sericea)* (Table 2).

**Table 1: Location Coordinates and Lot Size**

| **Location** | **Latitude** | **Longitude** | **Lot Size** |
|---|---|---|---|
| Locust Valley | 40.8996 | -73.5789 | 1861.55 square meters |
| West Islip | 40.7096 | -73.3105 | 1294.99 square meters |
| West Islip | 40.70929 | -73.31087 | 1375.93 square meters |

**Table 2: Tree Species by Location**

| **Location** | **Name of Tree** | **Scientific Name** | **Quantity** |
|---|---|---|---|
| Locust Valley | Atlantic White Cedar | *Chamaecyparis thyoides* | 6 |
| Locust Valley | Sugar Maple | *Acer saccharum* | 10 |
| Locust Valley | Red Maple | *Acer Rubrum* | 24 |
| West Islip | White Oak | *Quercus phellos* | 1 |
| West Islip | Rough Leaf Dogwood | *Cornus drummondii* | 1 |
| West Islip | Red Dogwood | *Cornus sericea* | 1 |
| West Islip | White Oak | *Quercus phellos* | 4 |

24 of the 40 trees (60%) identified in Locust Valley were Red Maple. 34 of the 40 trees (85%) were Maple Trees, indicating that not only is Red Maple the dominant species, but Maple Trees, in general, are the dominant in Locust Valley. The West Islip locations did not have as high density of trees as Locust Valley. Maple Trees were found to be in high concentration in residential properties on the North Shore but not on the South Shore of Long Island.

**Discussion:**

Our collected sample of trees consisted of 51% being identified as Red Maple in Locust Valley, NY. Matarazzo and Italiano (2016) also conducted a similar study. In their study they found different species of Maple Trees dominant in the Huntington Station area. They calculated that one property that they used in their study had 50% Maple and the other property had 30%. They demonstrated similar results to Maple trees being found on the North Shore of Long Island, just like the previous data that was found in table 2 of this study. Brown and Cosar (2016), identified five Red Maple trees located on a residential property in Commack NY and ten Red Maple trees on Southshore located on a residential property in Bay Shore NY. In a study done by Cardinale (2017) of trees in Makamah Nature Preserve in Northport, New York, one of the most common tree species that was found was also the Red Maple trees. They also reported having one Red Maple (*Acer rubrum)* from a residential property in East Northport. Some of the most popular trees found on Long Island are Maple trees. Although there were Maples (*Acer*) on both of the properties; only 1 Maple was the same species on both of the properties and both properties shared Red Maple. Castro et al (2016) also reported that the most popular genus was *Acer*. Twelve samples out of 41 total samples were from residential properties in Commack, Lindenhurst and Bayshore. One sample of *Acer* was found on each property. These results indicate that *Acer* is common on Long Island. In another study done by Ferry (2019), of the 45 trees surveyed from Sunken Meadow State Park in Kings Park, on the North Shore of Long Island, NY, 18 or 40% were Silver Maple trees, and 9 or 20% of the trees that were surveyed were Red Maple trees. In addition, Yaariet al. (2014) also found Silver Maple (*Acer saccharinum*), Sugar Maple (*Acer Saccharum*) and English Oak (*Quercus robur*) in Huntington. The species found in Brentwood were: Sugar Maple (*Acer Saccharum*) Sycamore Maple (*Acer pseudoplatanus*). The species found by them in Deer Park were: Stripe Maple (*Acer pensylvanicum*). They concluded that each property grew a different type of species belonging to the Maple Family (*Aceraceae*). Further, tree species were compared in the residential properties of Commack, Plainview, and East Islip (Bernero et al. 2013). Their data indicates a recurrence of Maple trees on their residential properties. Moreover, Moran (2005) states that the most common Maple tree native to Long Island is the Red Maple and Sugar Maples.

**Conclusion:**

Out of 47 trees surveyed, in three residential properties, Red Maple trees were found to be the dominant species in Locust Valley (51%) and White Oak trees were found to be the dominant (71%) in West Islip.

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# Novel Genotyping Assay of Melanocortin 4 Receptor

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**Keywords:** Biology, Genomics, Obesity, Genotyping Assay

**Abstract:**

America is facing an epidemic in unhealthy weight gain leading to obesity. There are a number of reasons as to why Americans are gaining so much weight at an alarming rate such as diet, exercise, and environmental factors (Choquet, 2010). Our focus was to determine if there could be any genetic factors that contributed to this sudden change. To determine this, we selected MC4R gene and created a genotyping assay to determine if variants in the MC4R gene could potentially contribute to obesity and weight gain (Huang, 2017). Our bioinformatic research determined that SNPs of the MC4R gene does negatively affect protein structure; hopefully, this assay can aid in the prevention of obesity and weight gain with the help of personalized medicine.

**Introduction:**

Personalized medicine is medical care that is customized for a specific patient. The information needed to formulate a customized care plan for a patient can be acquired through technology such as genotyping assays and sequencing. Genotyping assays are important because it allows us to gain insight on how the body will react when exposed to certain drugs and allows for the preemption of the progression of a disease as well as improving the quality of care for an individual. The studying of one's genome can aid in patient care as well. Genomics is the study of a person's genome and the interactions between genes and their environment (National Human Genome Research Institute 2019). Sequencing a person's genome allows researchers to identify any genetic variations or mutations. Even small changes to one's DNA sequence, such as the substitution, deletion, or addition of a single base pair, may play a significant role in the progression of a disease (National Human Genome Research Institute 2019). Both mutations and SNPs indicate changes in a DNA sequence. When the same nucleotide variation exists among at least 1% of the population, it is considered a SNP. SNPs are single nucleotide polymorphisms which are used in personalized medicine in order to predict an individual's response to specific drugs and disease susceptibility. Our gene of interest is MC4R. MC4R is a melanocortin receptor that is responsible for the regulation of energy homeostasis and somatic growth. Mutations in the MC4R gene are linked to 1%-6% of cases of severe early-onset obesity (Doulla 2014). A person's chances of developing early-onset obesity can be increased by epigenetic mechanisms involved in gene expression. By identifying mutations in the MC4R gene, early diagnosis and effective prevention and management can occur (Choquet 2010).

**Materials and Methods:**

We used the bioinformatic techniques to create a genotyping assay for the SNP rs13447331 (G/A) in the MC4R gene.

A. We used the University of California Santa Cruz (UCSC) Genome Browser (https://genome.ucsc.edu) to identify the genomic sequence, level of conservation across species, and protein sequence for use in the creation of the assay. We used the Dec. 2013 (GRCh38/hg38) genome to do so.

B. We used the National Center for Biotechnology Information (NCBI) server dbSNP (https://www.ncbi.nlm.nih.gov) which is a database of all known SNPs for a particular gene. We used

this to identify a deleterious SNP to choose for our assay, so we checked the Global MAF (minor allele frequency), whether it was labeled as deleterious or benign and whether it was in an intron or an exon favoring those in exons because exons are those that are expressed.
C. We used PolyPhen-2 (Polymorphism Phenotyping v2) (http://genetics.bwh.harvard.edu/pph2/) and MUpro: Prediction of Protein Stability Changes for Single Site Mutations from Sequences (http://mupro.proteomics.ics.uci.edu) to identify whether the SNP was deleterious or not.
D. We used the New England Biolabs (NEBCutter) (http://nc2.neb.com/NEBcutter2/) to identify whether the SNP would be cut in either the major allele state or the minor allele state.
E. We used Primer 3 (http://bioinfo.ut.ee/primer3-0.4.0/) to identify the primers. This is to help create our genotyping assay.

Bench Work Protocol:

We would use the polymerase chain reaction (PCR) protocol from Qiagen (Venlo, Netherlands). This protocol calls for 25ul reaction of Qiagen Master Mix 12.5ul Master Mix, 0.5 ul Primer L, 0.5 ul Primer R, 0.5 ul genomics DNA at 100ng/ul, 10.5 H20.

Using a thermocycler, we would run the PCR 95°C for 5 min, 30- 40 cycles of (95°C for 15 sec, 58°C for 30 sec, and 72°C for 30 sec) followed by a 72°C for 10 min and a 4°C hold. The restriction enzyme (Hinf1) protocol is from Thermo Fisher Scientific (Waltham, MA). We would follow the Protocol for Digestion of PCR Products Directly after Amplification. Using gel electrophoresis, we would then run the samples on a 1% agarose gel for 20 minutes. We visualized this using alpha imager.

**Results:**

Our SNP is rs13447331. The major allele is G and the minor is A. This codes for an amino acid change of Serine (Ser) to Leucine (Leu). This SNP is most prevalent in Ashkenazi Jews with a percentage of 99.88%. We realized it is conserved across species since the SNP was more than 1% across the population. This also means that the SNP has some type of clinical relevance. We used MUPro to find out that we have an increase in instability (Figure 1). The Polyphen results show how the SNP is deleterious because it scored a 1.0 (Figure 2). We found the left primer to be CGGATGCACAGAGTTTCACA and the right primer to be ACCTGTCCACTGCAATTGAA, the melting point is Tm: 58.49 and 57.64 for our SNP of rs13447331. In figure 3a and 3b it shows the restriction enzyme that is used is Hinfl. We found the reference site has a restriction enzyme which cuts at GACTC. Also, the PCR fragment amplifies at 108 and the restriction enzyme cuts to produce a fragment that is 46 base pairs and 63 base pairs. The sequence with the mutation does not have the restriction enzyme sites so the full fragment 108 base pairs will be visible in the gel. As shown in figure 4, the genotyping assay is run on gel electrophoresis and shows how it is expressed.

**Figure 1: MUPro snapshot: shows the SNP is increasing in stability**

**Prediction Results:**

1. Predicted both value and sign of energy change using SVM and sequence information only (Recommended)

detal delta G = 0.059152624 (INCREASE stability)

2. Prediction of the sign (direction) of energy change using SVM and neural network with a smaller sequence window

Method 1: Support Vector Machine, use sequence information only.
Effect: DECREASE the stability of protein structure.
Confidence Score: -0.061266033

Method 2: Neural Network, use sequence information only.
Effect: INCREASE the stability of protein structure.
Confidence Score: 0.5569991052213938

**Figure 2: Polyphen snapshot: shows the SNP is deleterious……………………………………**

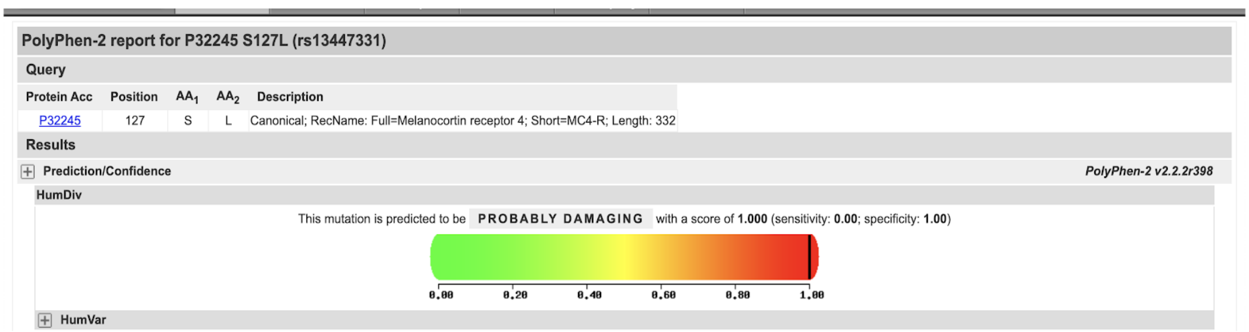



**Figure 3a: Reference sequence snapshot with Hinfl1 restriction enzyme present**

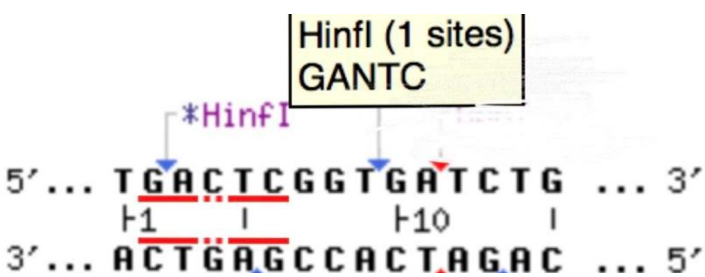
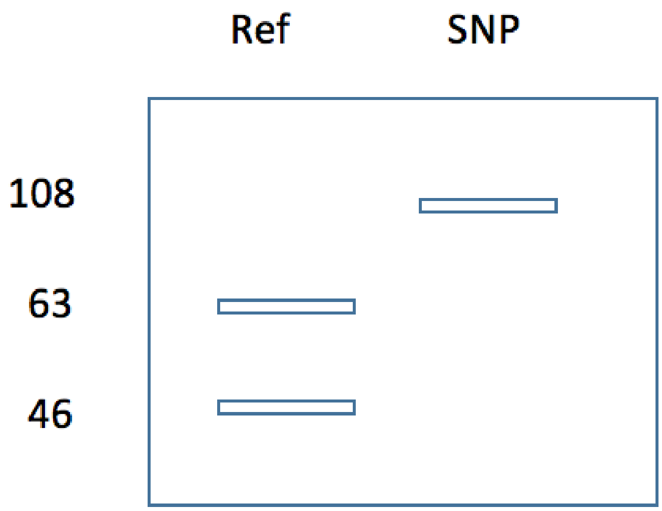



**Figure 3b: Sequence with mutation, the restriction enzyme site is not present**


**Figure 4: Genotyping assay as run on gel electrophoresis for the reference without mutation the restriction enzyme will cleave 108 base sequence into 2 fragments, one that is 46 base pairs and another that is 63 base pairs. The amplified fragment of 108 base pairs (G-A) does not have restriction enzyme site and will not cleave the fragment and will run the full 108 base pair sequence.**




**Discussion:**

Since our genome browser search identified our gene as conserved across species, this means that our SNP has clinical relevance because this amino acid has not changed over years of evolution. In the figure below, you can see the interpreted conditions and their interpretations- whether conflicting interpretations of pathogenicity or solely pathogenic. The first one listed is obesity, which has become a huge epidemic in our country today. Obesity is often the result of consuming more calories per day than are burned by physical exercise and daily activities thus leading to excessive bodily fat and increased risk of health problems. The second is not provided. The third condition that we see listed is Body Mass Index Quantitative Trait Locus 20 listed on this table of clinical significance. A quantitative trait locus is a region of DNA which is associated with a particular phenotypic trait. In this particular case, QTL 20 is an obesity quantitative trait locus. These are ways in which our SNP is clinically relevant, which is primarily obesity and it effect on the human body.

**Figure 5:** "rs13447331 RefSNP Report - DbSNP - NCBI." *National Center for Biotechnology Information, U.S. National Library of Medicine,* www.ncbi.nlm.nih.gov/snp/rs13447331#clinical_significance.

| Interpreted condition | Interpretation | Number of submissions | Review status | Last evaluated | Variation/condition record |
|---|---|---|---|---|---|
| Obesity | Conflicting interpretations of pathogenicity | 2 | criteria provided, conflicting interpretations | May 25, 2017 | RCV000015412.30 |
| not provided | Conflicting interpretations of pathogenicity | 3 | criteria provided, conflicting interpretations | Mar 3, 2017 | RCV000414065.2 |
| BODY MASS INDEX QUANTITATIVE TRAIT LOCUS 20 | Pathogenic | 1 | no assertion criteria provided | Feb 1, 2004 | RCV000768580.1 |

In regards to our Polyphen results, our SNP scored a 1.00 and this would be the case if the SNP has potentially deleterious effects to human health. Our SNP in particular is correlated with obesity. From our MUPro results, we were able to predict protein stability changes for single site mutations from our protein's sequence. We found that our SNP in particular increases stability with a score of 0.059152624. This increase in stability means that there can be both a change in the structural and conformational structure of the protein thus leading to an effect of its overall function within the body. The explanation for this increase in stability could be due to an increase in hydrogen bonding. Hydrogen bonding is the process of which hydrogen is bound to a larger, more electronegative atom or group, which could be molecules like oxygen or nitrogen. When it comes to correlation, it seems that our SNP rs13447331 and obesity can be linked to each other after interpreting all the research we have assembled in our genomic assay.

This mock PCR is a representation of how an actual assay would be implemented. The creation of this genotyping assay can benefit personalized medicine in many ways. By creating a genotyping assay, researchers and physicians can determine how an individual will react when exposed to certain drugs. This mock PCR helped us to gain better insight on the specific gene melanocortin 4 receptor. We were able to determine that this specific gene, if mutated, can be directly linked to obesity in humans. Obesity has become so prevalent in society today, and it is important to be aware if you are at risk personally. Through this mock PCR and genotyping assays, we can study more genes and become more educated in this area of genomics.

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# Red Maples are Dominant by a Pond While Black Oaks are Dominant by the Bay in Centerport, NY

**Authors:** Alexandra Lauber and Jessica Horne

**Keywords:** North Shore, Long Island, Native Trees, Red Maple, Black Oak

**Abstract:**

We surveyed two plots of land in Centerport, NY one at the Betty Allen Twin Pond Preserve and the other at the Phragmites Park which is directly across from the Preserve located in Centerport, NY. A total of forty tree samples were taken from each location and identified using two dichotomous keys and an app called "Leaf Snap". Twenty trees were surveyed next to Betty Allen Pond on Route 25 A. Twenty trees were surveyed on the property of the north side of 25 A, also called the Phragmites Dog Trail, part of the Betty Allen Preserve, close to Northport Harbor, bay-side. We discovered that Red Maple trees are dominant by the pond side of Betty Allen Preserve, while Oak trees appear dominant on the bay side of the preserve.

We identified the following trees on the pond side of the preserve in Centerport: six Red Maple *(Acer rubrum*), three Northern Spice Bush (*Lindera benzoin*), one White Mulberry *(Morus*), two Quassia or Tree of Heaven (*Quassia amara*), two Oriental Bittersweet (*Celastrus*), two Tulip Poplar (*Liriodendron tulipifera*), three Summer Sweet Pepper Bush (*Clethra alnifolia*) and one Scoular Willow (*Salix scouleriana*). On the bay side of the Preserve in Centerport, NY we identified the following trees: five Paradise Apple (*Malus domestica*), one Northern Red Oak (*Quercus rubra*), one Silver Birch (*Betula pendula*), one Black Cherry (*Prunus serotina*), five Black Oak (*Quercus velutina*), one Scarlet Oak (*Quercus coccinea*), two Shumard Oak *(Quercus shumardii*), one Red Maple (*Acer rubrum),* one Black Jack Oak (*Quercus marilandica*) and one Flowering Dogwood, (*Cornus florida).*

**Introduction**:

The North Shore of Long Island has a variety of native and non-native trees that grow well depending on the type of soil, the pH level of the soil and the climate. Long Island has a vast range of topography mainly influenced by the bodies of water that surround it, therefore different types of trees can be found. The soil of the North Shore of Long Island is in an area considered to be Association 2 according to Cornell Cooperative Extension of Suffolk County (1975). "Association 2 which compromises 26% of Suffolk County is made up of Haven's Loam, which supports black, white and Northern Red Oak as well as Beech and Maple, and Riverhead Sandy Loam which supports Black, White and Red Oaks, American Beech and Sugar Maple." (Cornell Cooperative Extension. 1975).

In our findings of tree samples and identifying the different trees closest to the bay, we found 11 Oak trees out of 20 trees surveyed. On the pond side of the preserve there was a total of 6 Maples out of 20 trees. The pH level of the soil at the Betty Allen Pond Preserve is a 7.5 on the pH scale. Red Maple's natural habitat is usually cool, moist soil with a slightly alkaline pH level, however it can grow in some acidic soils, and grows best by swamps or marshes. On the pH scale a 3.7 is the ideal level for Maples. The pH level of the soil at the Phragmites Park is a 4.5-5 on the pH scale. Black oaks and other Oak species grow best in acidic, dry and sandy soils. Fallen leaves help add acid to the soil which make the soil richer and more nutrient-filled for Oaks. When an Oak leave first falls the pH of the leaf is acidic. Leaves that have freshly fallen have a pH between 4.3- 5.3 level.

The average temperature of Centerport, NY in the month of October is 17.6 degrees Celsius. The elevation of the land at the Betty Allen Preserve is 16 feet or 5 M. The latitude at Betty Allen Pond Preserve is 40. 8836 degrees and the longitude is -73.3622. The elevation of the land at Phragmites Park is 19.6 feet or 6 M. The latitude of the Phragmites Park is 40.888997 and the longitude is -

73.36569.

A dichotomous key is a tool that one can use to identify the type of tree by the leaves and buds on the tree branch. It can also be used to determine the identity of items in the natural world such as trees, wildflowers, mammals, reptiles, rocks, and fish. The “key” consists of a series of choices that lead you to the correct name of a given item. "Dichotomous" means "divided into two parts". Therefore, a dichotomous key always gives two choices to each step.

**Method:**

Tree branch samples were taken from forty trees surveyed on each plot of land, (bay and pond side). We collected 20 tree samples from the Betty Allen Pond Preserve and 20 tree samples from the Phragmites Park in Centerport, NY located on Route 25 A. We used a standard tape measure to measure the two plots of land that we surveyed. The area of trees measured by the pond was 18.288 meters by 18.288 meters. The area of trees measured by the bay was 18.288 meters by 15.24 meters. Every tree that was within the square of each piece of property surveyed was recorded and the diameter measured. The latitude and longitude of each area surveyed in the Preserve were obtained by using the app Google Maps. Two types of dichotomous keys were used to identify the leaves from tree branches that were collected from each tree. The dichotomous keys that were used to identify the 40 branches and leaves we took as samples were, “Tree Finder,” (Watts, 1991), “Trees, Peterson First Guides,” (Petrides.1998), and a mobile App, “Leaf Snap,” (Jacobs D. 2016).

**Results:**

The two tables below show each tree that was identified on the two different areas of the Betty Allen Pond Preserve. The latitude and longitude of each tree is recorded as well as the circumference of each tree’s trunk and the scientific name of each species recorded. We numbered the trees as we measured them on each plot of land.

**Table 1. Betty Allen Pond Preserve-Pond Side Trees**

| Tree # | Common Name | Scientific Name | Circumference (in Meters) | Native or Non-Native | Lat/Long |
|---|---|---|---|---|---|
| #1. | Red Maple | *Acer rubrum* | 0.8382 m. | Native | 40.8841<br>-73.3617 |
| #2. | Red Maple | *Acer rubrum* | 0.8636 m. | Native | 40.8841<br>-73.3616 |
| #3. | Red Maple | *Acer rubrum* | 0.4572 m. | Native | 40.8841<br>-73.3616 |
| #4. | Red Maple | *Acer rubrum* | 0.2286 m. | Native | 40.8841<br>-73.3617 |
| #5. | Red Maple | *Acer rubrum* | 1.143 m. | Native | 40.8842<br>-73.3616 |
| #6. | White Mulberry | *Morus* | 0.3556 m. | Native | 40.8841<br>-73.3618 |
| #7 | Northern Spice Bush | *Lindera benzoin* | 0.6096 m. | Native | 40.8840<br>-73.3617 |
| #8. | Northern Spice Bush | *Lindera benzoin* | 0.2032 m. | Native | 40.8840<br>-73.3617 |
| #9. | Quassia | *Quassia amara* | 0.4318 m. | Non-Native | 40.8841<br>-73.3618 |
| #10. | Northern Spice Bush | *Lindera benzoin* | 0.254 m. | Native | 40.88832<br>-73.3606 |
| #11. | Oriental Bittersweet | *Celastrus* | 0.2286 m. | Non-Native | 40.8832<br>-73.3606 |
| #12. | Oriental Bittersweet | *Celastrus* | 1.8288 m. | Non-Native | 40.8841<br>-73.3617 |
| #13. | Quassia | *Quassia amara* | 0.5334 m. | Non-Native | 40.84836<br>-73.3606 |
| #14. | Tulip Poplar | *Liriodendron tulipifera* | 0.889 m. | Native | 40.8833<br>-73.3607 |
| #15. | Tulip Poplar | *Liriodendron tulipifera* | 0.254 m. | Native | 40.8840<br>--73.3615 |
| #16. | Red Maple | *Acer rubrum* | 0.635 m. | Native | 40.8841<br>-73.3617 |
| #17. | Summer Sweet Pepper | *Clethra alnifolia* | 0.2286 m. | Native | 40.8841<br>-73.3617 |
| #18. | Summer Sweet Pepper Bush | *Clethra alnifolia* | 0.4826 m. | Native | 40.8840<br>-73.3616 |
| #19. | Scoular Willow | *Salix scouleriana* | 0.4826 m. | Native | 40.8840<br>-73.3616 |
| #20. | Summer Sweet Pepper Bush | *Clethra alnifolia* | 0.1016 m. | Native | 40.8841<br>-73.3616 |

**Table 2. Phragmites Park-. Bay-Side Trees**

| Tree # | Common Name | Scientific Name | Circumference (In Meters) | Native/ Non-Native | Latitude/ Longitude |
|---|---|---|---|---|---|
| #1. | Paradise Apple | *Malus domestic* | .7874 m. | Native | 40.8881 -73.3622 |
| #2. | Paradise Apple | *Malus domestic* | 0.3048 m. | Native | 40.8881 -73.3622 |
| #3. | Paradise Apple | *Malus domestica* | 0.3048 m. | Native | 40.8881 -73.3623 |
| #4. | Northern Red Oak | *Quercus rubra* | 1.6256 m. | Native | 40.8881 -73.3623 |
| #5. | Silver Birch | *Betula pendula* | 0.1905 m. | Native | 40.8881 -73.3622 |
| #6. | Black Cherry | *Prunus serotina* | 0.6096 m. | Native | 40.8882 |
| #7. | Black Oak | *Quercus velutina* | 0.6096 m. | Native | 40.8882 -73.3623 |
| #8. | Paradise Apple | *Malus domestica* | 0.3048 m. | Native | 40.8882 -73.3623 |
| #9. | Paradise Apple | *Malus domestica* | 0.381 m. | Native | 40.8882 -73.3623 |
| #10. | Scarlet Oak | *Quercus coccinea* | 1.6764 m. | Native | 40.8877 -73.3622 |
| #11. | Black Oak | *Prunus serotina* | 1.0414 m. | Native | 40.8880 -73.3623 |
| #12. | Shumard Oak | *Quercus shumardii* | 0.1016 m. | Native | 40.8881 -73.3621 |
| #13. | Red maple | *Acer rubrum* | 0.2286 m. | Native | 40.8881 -73.3620 |
| #14. | Black Oak | *Quercus velutina* | 0.889 m. | Native | 40.8881 -73.3620 |
| #15. | Blackjack Oak | *Quereus marilandica* | 0.381 m. | Native | 40.8880 -73.3620 |
| #16. | Black Oak | *Quercus velutina* | 0.254 m. | Native | 40.8880 -73.3620 |
| #17. | Black Oak | *Quercus velutina* | 0.7112 m. | Native | 40.8880 -73.3621 |
| #18. | Bur Oak | *Quercus macrocrpa* | 0.889 m. | Native | 40.8880 -73.3621 |
| #19. | Shumard Oak | *Quercus shumardii* | 0.6096 m. | Native | 40.8880 -73.3621 |
| #20. | Flowering Dogwood | *Cornus florida* | 0.381 m. | Native | 40.8881 -73.3621 |

The properties surveyed at the Betty Allen Pond preserve and the Phragmites Dog Trail had the following species in common; the Red Maple (*Acer rubrum*). By the pond, we surveyed six Red Maples (*Acer rubrum*), and no Oaks were found in the area- 30% of the trees surveyed by pond were Red Maples and 0% were Oak. The land by the bay had a total of eleven Oak trees, six different species which included, Black Oak *(Quercus velutina)*, Scarlet Oak (*Quercus coccinea)*, Bur Oak (*Quercus macrocrpa*), Shumard Oak (*Quercus shumardii*), Blackjack Oak (*Quereus marilandica*), and Northern Red Oak (*Quercus rubra*), and only one Red Maple (*Acer rubrum*) recorded on the plot of land we surveyed. Therefore 55% of the trees were Oak and 5% were Red Maple.

**Discussion:**

The Red Maple tree is very common throughout the woods on Long Island. Although they are most commonly found near wetlands, they are also known to thrive in the widest variety of conditions of any of the maples described here, including drier habitats. (Moran, Edward. 2005). The Red Maple, (*Acer rubrum*), the Tree of Heaven, (*Quassia amara*), the Flowering Dogwood, (*Cornus florida*) and the Black Cherry, *(Prunus serotina*) were trees found on both areas of the pond Preserve. These findings are similar to the trees identified in Northport, Commack and Huntington, (North Shore Area), by Puca, D., Liguori, A & Marando, C. (Liguori, Marando. Saturn Journal 2013). The largest number of Oak species is in North America. For the best growth of Oak trees, the soil has to be fertile, well-drained, deep and moist. Oak trees require 8 hours of sunlight every day. Good air ventilation is also needed. For the development of the Oak tree, nutrient rich soil is necessary. The pH level of soil should be 3.6 to 7. Fertilized soil improves the acidity levels of soil and nutrients. (Learn About Nature, Tree Archives. 2019)

**Conclusion**:

Among the forty trees we surveyed we found there was a dominant number of Red Maple (*Acer rubrum*) on the pond side of the Betty Allen Preserve. The Black Oak (*Quercus Velutina)* was the dominant Oak species on the bay side of the Phragmites Park preserve in Centerport, NY. Although Oaks were dominant on the bay-side we did find 1 out of 20 trees to be a Red Maple (*Acer*), therefore concluding that Red Maples are able to survive in the more acidic soil of the Phragmites Preserve. We did not identify any species of Oak on the land surveyed on the pond side which was most likely due to the high alkaline pH level of the soil. Therefore, our findings of the trees surveyed on the parallel plots of land in the Betty Allen Preserve gave us the conclusion that Red Maples do grow better in the more alkaline soil of the pond area and Oak trees thrive in the sandier, dry acidic soil closer to the bay of Phragmites Park.

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**Native Trees in Western Suffolk County New York are also found to be Dominant**

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**Key Words:** Western Suffolk, Native, Non-Native, Dominant, Non-Dominant, Deer Park, West Islip, Commack.

**Abstract:**

Surveying tree species in Suffolk county will determine whether native or non-native species are dominant in this region. Our hypothesis was that each property surveyed would yield similar trees. A total of 42 trees were surveyed in this study using dichotomous keys to identify trees from three different properties in Western Suffolk, NY. All trees were identified by their leaves, barks, and buds. We determined that our hypothesis was disproven in that each property had unique trees with no species overlap between properties. The native trees to Long Island were dominant overall (52%). This finding conflicts with findings in the literature regarding tree populations in Suffolk county.

**Introduction:**

In this study a dominant species is one whose population prevails over other populations of different species. Native species is a species that originated in a particular region. Both preceding definitions have been adapted from Merriam Webster Dictionary (2019). The climate determines the types of species that can grow in a region. The climate of Suffolk County is normally sunny most of the year. It has an average rainfall of 119.38 centimeters per year and 68.58 centimeters of snow per year. As well as an average high temperature in the Summer of 27.8 °C, and an average low temperature during the winter of -5 °C (Sperling's Best Places, 2019).

**Method:**

We collected branches from 42 trees on three residential properties. Then, we identified each of the trees from the properties using three dichotomous keys (Watts 1970, Watts 1998, Williams 2007). The latitudes and longitudes of each residential property was found using Google Maps 2019.

**Results:**

We found that 52% of the trees were native and 48% of the trees were not native. Our hypothesis was that there would be similar trees on each of the properties since it was the same county the samples were all taken from. We found that our hypothesis was incorrect. All the species were different. None of the trees overlapped the properties. Which means that none of the trees were on two different properties. Out of all the species of trees, the Arborvitae and the Leyland Cypress were the most dominant trees. There was a total of five Leyland Cypress (11.9%) and eight Arborvitae (19%). Both the Leyland Cypress and Arborvitae were located in the town of West Islip, NY. Out of those two species, only the Arborvitae is native to Western Suffolk, NY.

**Table 1: Location of each Data Point**

| | Location 1 | Location 2 | Location 3 |
|---|---|---|---|
| Town | Deer Park | Commack | West Islip |
| Coordinates | 40°45'30.0"N 73°19'26.8"W | 40°51’56.3”N 73°15’46.7”W | 40°43’15”N 73°17’36”W |
| Amount of Trees | 12 | 15 | 15 |

**Table 2: Results of Identified Trees**

| **Tree Name** | **Quantity** | **Location** | **Percentage** | **Scientific Name** | **Native** |
|---|---|---|---|---|---|
| Eastern White Oak | 1 | Commack | 2.4% | *Quercus alba* | Yes |
| Balsam Willow | 1 | Commack | 2.4% | *Salix pyrifolia* | Yes |
| Western Soapberry | 1 | Commack | 2.4% | *Sapindus saponaria* | No |
| Shingle Oak | 1 | Commack | 2.4% | *Quercus imbricaria* | No |
| Sugar Maple | 2 | Commack | 4.8% | *Acer Saccharum* | Yes |
| Hooker Willow | 2 | Commack | 4.8% | *Salix hookeriana* | No |
| Arkansas Oak | 1 | Commack | 2.4% | *Quercus arkansana* | No |
| Chalk Maple | 1 | Commack | 2.4% | *Acer leucoderme* | No |
| Flowering DogWood | 1 | Commack | 2.4% | *Cornus florida* | Yes |
| Hardy Catalpa | 2 | Commack | 4.8% | *Warder ex Engelm* | No |
| Roughleaf Dogwood | 1 | Commack | 2.4% | *Cornus drummondii* | Yes |
| Hercules-Club | 1 | Commack | 2.4% | *Aralia spinosa* | No |
| Dogwood | 1 | West Islip | 2.4% | *Cornus* | Yes |
| Japanese Maple | 1 | West Islip | 2.4% | *Acer palmatum* | Yes |
| Leyland Cypress | 5 | West Islip | 11.9% | *Cupressus × leylandii* | No |
| Arborvitae | 8 | West Islip | 19% | *Thuja occidentalis* | Yes |
| Coral Bark Maple | 1 | Deer Park | 2.4% | *Acer palmatum* | Yes |

| | | | | | |
|---|---|---|---|---|---|
| Black Spruce | 1 | Deer Park | 2.4% | *Picea pungens* | Yes |
| Weeping Norway Spruce | 1 | Deer Park | 2.4% | *Picea abies* | Yes |
| Oxydendrum Sourwood | 1 | Deer Park | 2.4% | *Oxydendrum arboreum* | Yes |
| Silver Maple | 1 | Deer Park | 2.4% | *Acer saccharinum* | No |
| Purple Leaf Plum | 2 | Deer Park | 4.8% | *Prunus cerasifera* | No |
| Crab Apple | 1 | Deer Park | 2.4% | *Malus sylvestris* | Yes |
| Kousa Dogwood | 1 | Deer Park | 2.4% | *Cornus kousa* | Yes |
| Snow Fountain Cherry | 3 | Deer Park | 7.5% | *Prunus x 'Snowfozam* | No |

**Discussion:**

We hypothesized that since all properties had the same topography, and were found in the same county of New York, there would be multiples of the same trees on all three properties. It was fascinating that of the forty-two trees on all the properties, that no two properties had the same trees in Suffolk, NY.  Over half the trees in the results are native to Long Island according to Shade Trees Nursery (2017). We hypothesized that the trees surveyed would be non-native because the selection of all of our trees is different. This finding disputes other studies that the native trees are dominant. Our results were 52% native and 48% non-native. However, other studies in Long Island have found that 23% of species in an area are native and 77% were non-native (Dickran et al. 2019) Two other studies showed the same results. 44% were native, and 68% were non-native (Campitiello et al. 2015), and 35% were native, while 65% were non-native. (Longo et al. 2015). According to these studies, our results showed that our findings are a novel finding across Long Island.

**Conclusion:**

Our group has concluded that native trees are dominant based on our results. According to other peoples findings, native trees aren't dominant. It is possible since we had multiples of the same native tree species that they grew across the properties. Based on the topography and location of the three properties, we expected for our hypothesis to be correct and our trees to be non-dominant for native trees and dominant for non-native trees. According to our results, that is not the case.

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# Red Cedar is a Dominant Tree in Dix Hills in Central Long Island but not in Lindenhurst on the South Shore

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**Key Words:** Red Cedar, Dix Hills, Lindenhurst

**Abstract:**

We surveyed tree species of two residential properties in the town of Dix Hills, near the North Shore of Central Long Island, and Lindenhurst which is located on the South Shore. Even though both towns are in Suffolk County, Lindenhurst is located in the town of Babylon while Dix Hills is the town of Huntington. The forty trees surveyed were identified by using two different dichotomous keys. We found that the Red Cedar is a dominant tree in Dix Hills in central Long Island but not in Lindenhurst on the south shore.

**Introduction:**

Dix Hills is located in the center of Long Island. Since Dix Hills is a part of the Town of Huntington it has some similarities to the North Shore. The topography can be quite hilly in many places and the soil tends to be acid rocky clay. Google Topography (2018) reports that the South Shore was formed by the "wash-out" from the moraine, so it is almost entirely flat; the soil tends to be light, sandy and well drained except in the areas that were or are near salt marshes. There is also a climate difference between the North and South Shores as the South Shore tends to be cooler due to the bay and the ocean (Google Inc.2018). The elevation in Lindenhurst is 9.144 meters and the elevation in Dix Hills is 61.8744 meter. Areas with higher elevation sites tend not to have high soil pH and salinity problems that low elevation sites have. In this town the Red Cedar was the most dominant tree surveyed in Dix Hills. The Red Cedar is the most widely distributed to the east and is native in 37 states. It is resistant to extremes of drought, heat, and cold. The colors of the tree vary from gray-green to blue-green to light- or dark-green. The trunk is often angled but has a strong and narrow base. This tree usually grows between 9.144 meters and 12.192 meters but is capable to reach up to 27.43 meters (Wildflower 2019).

**Method:**

In this experiment we surveyed forty trees from two residential properties in Suffolk County, NY. We used a dichotomous key (Watts, 1998) to figure out the scientific name of each specific tree. We then surveyed how many of the same trees we have and what the exact coordinates were, and displayed them in the table below. Using Google Maps (Google Inc. 2018), we found the Longitude and Latitude of both properties. The coordinates for the Lindenhurst property are 40° 40' 28.056" N 73 21' 42.588" W and the coordinates for the Dix Hills property are 40° 46' 49.71" N 73°20'02.89" W.

**Results:**

Our hypothesis was that our trees will be different based on the environment of Lindenhurst which is on the south shore and Dix Hills in central Long Island. The Red Cedar was found to be dominant in Dix Hills, but not in Lindenhurst. It comprised 30% of the total trees. The result of this experiment supported our hypothesis. We did not have any similar trees which is shown on the charts below.

**Table 1: Location of Data**

| Town: | Dix Hills | Lindenhurst |
|---|---|---|
| Coordinates: | 40° 46’ 49.71” N 73°20’02.89” W<br>Elevation: 42.0624 meters | 40° 40’ 28.056” N 73 21’ 42.588” W<br>Elevation: 0.3048 meters |
| Total Trees: | 30 | 10 |

**Table 2: Result of Identified Trees**

| Tree Name (Scientific Name) | Quantity | Location | Percentage |
|---|---|---|---|
| Horse Chestnut *(Aesculus hippocastanum)* | 4 | Dix Hills | 10% |
| Bald Cypress *(Taxodium distichum)* | 2 | Dix Hills | 5% |
| White Oak *(Quercus alba)* | 6 | Dix Hills | 15% |
| Red Cedar *(Juniperus virginiana)* | 12 | Dix Hills | 30% |
| Tree of Heaven *(Ailanthus altissima)* | 2 | Dix Hills | 5% |
| Choke Cherry *(Prunus virginiana)* | 3 | Dix Hills | 7.5% |
| Arbor Vitae (*Thuia accidentalis*) | 1 | Dix Hills | 2.5% |
| Red Maple Tree (A*cer rubrum*) | 4 | Lindenhurst | 10% |
| American Mountain Ash (S*orbus americana*) | 3 | Lindenhurst | 7.5% |
| Black Ash (F*raxinus nigra*) | 3 | Lindenhurst | 7.5% |

**Discussion:**

The Red Cedar (*Juniperus virginiana*) was the most native tree in Dix Hills while the Red Maple tree (*Acer rubrum*) is in majority in Lindenhurst. Dormer et al (2019) found that the Red Maple (*Acer rubrum*) is the dominant species on the North Shore, this study found that Red Maples aren't only common on the North Shore but along the South Shore as well. According to the Wild Flower Center (2019) the water use for a Red Maple is high and is usually found in moist woodlands and wet swamps. However, the Red Cedar water use is low and is usually dry soil. Although the two locations have the same topography and that are still in the same county the elevation is the reason as to why we do not have similar trees. In a previous survey done by Portillo and Regenbogen (2019) the dominant tree in Dix Hills was arbor vitae. However, table two shows that the arbor vitae was a minority on the Dix Hills property.

**Conclusion:**

The Red Cedar (*Juniperus virginiana*) is dominant in Dix Hills located in Central Long Island while not in Lindenhurst on the South Shore of Long Island, N.Y.

**References:**


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# Norway Maple *(Acer plantanoides)* is a Dominant Tree Species on Residential properties in the Town of Islip, New York

**Authors**: Rachel Rhodes, Christina Lane, Katelyn Williamson, Sabina Hritz

**Keywords:** Taxonomy, Native, Non-native, Trees, Shrubs, Suffolk County, East Islip, Islip, Bayshore, Brentwood

**Abstract**

Trees surveys were preformed from six different residential properties in the town of Islip, NY. The tree species were identified and confirmed by using two dichotomous keys. The Norway Maple (*Acer plantanoides)* is the most dominate species. Maples were the most abundant clade, being 60% of the total tree population.

**Introduction**

Botany is the study of plants. A native plant in long island is able to survive the harsh winters and the warm summers. With the soil on long island also helps the trees growing and remaining stable. 26% of Suffolk County Haven loam. This soil contains supports black, white and northern red oak as well as beech and maple. (Cornell Cooperation Extension Suffolk County 4). Two dichotomous keys are used to determine the trees in great detail. In this study, trees samples were taken in Islip, Bayshore, Brentwood, and East Islip. In four different areas of long island, the students can conclude that there will be different trees species on each property.

**Results:**

After collecting fifty-three different samples of trees from different towns in Suffolk County, we noticed that the least common trees were found in the town of Brentwood. Bayshore, East Islip, and Islip were abundant in Maple trees and there were no Maple trees on the property in Brentwood. Norway Maple is very common is a very common tree species found in the Bayshore area. 32 (60%) of the total trees were Maples. 47% of the Maples were the Norway Maple. The Norway Maple (*Acer plantanoides*) was found to be the most abundant in three out of the four towns we surveyed, East Islip, Islip and Bayshore.

**Table 1: Location of Each Property**

| | **Location 1** | | **Location 2** | **Location 3** | **Location 4** | |
|---|---|---|---|---|---|---|
| **Town** | **East Islip** | | **Islip** | **Brentwood** | **Bay Shore** | |
| **Coordinates** | Latitude 40.7320 Longitude: 73.857 | Latitude 40.728999 Longitude -73.173827 | Latitude: 40.73627, Longitude: -73.204625 | Latitude: 40.794585, Longitude: -73.254651 | Latitude: 40.747018, Longitude: -73.234098 | Latitude: 40.746838 Longitude: -73.233736 |
| **Amount of trees** | 7 | 9 | 9 | 13 | 11 | 4 |

**Table 2: Results of Trees**

| Tree Type (Scientific Name) | Quantity | Location | Percentage |
|---|---|---|---|
| *Norway Maple (Acer plantanoides)* | 15 | Islip/ Bay Shore | 28.3% |
| *Sugar Maple (Acer nigrum)* | 8 | Islip/East Islip | 15% |
| *Califoniacum (Boxloer)* | 5 | East Islip/Islip | 9.3% |
| *Valley oak (Quercus lobata)* | 2 | East Islip | 3.7% |
| *Vine maple (Acer circinatum)* | 9 | East Islip/ Bayshore | 16.9% |
| *Red cedar (Juniperus Virginiana)* | 1 | Brentwood | 1.8% |
| *Pacific madrone (arbulus menz)* | 2 | Brentwood | 3.7% |
| *Black Locust (robinia pseudoacasia)* | 3 | Brentwood | 5.66% |
| *Florida anise (illiesum flordiaum)* | 4 | Brentwood | 7.54% |
| *Sycamore (platanus accisentalis)* | 4 | Brentwood | 7.54% |

**Discussion:**

In this study, the Norway Maple was the most abundant tree species. Naru (2019) found that the Norway Maple was the most abundant tree species on residential properties in Bayshore. Dormer et al (2019) also found the Norway Maple to be abundant on Long Island.

**Conclusion**:

Norway Maple *(Acer plantanoides)* is a dominant tree species on residential properties in the Town of Islip, New York.

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# Mollusks and Tides of Eaton's Neck, New York

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**Keywords:** Suffolk County, Northport Bay, Gastropods, Bivalves, Tides, Beach, Clams, Scallops, Oysters, Mussels, Whelks.

**Abstract:**

Seven different species of Bivalve and Gastropod shells were surveyed from the coastline of Northport Bay, while forty-five individual shells of the seven types of mollusks were collected. All samples were collected in the Intertidal zone. The dominant species were the Atlantic Bay Scallop (*Argopecten irradians*) and the Eastern Oyster (*Crassostrea virginica*).

**Introduction:**

The survey was done at Hobart Beach on the bay side, overlooking Northport village. All the shell samples were collected in an area called the Intertidal Zone. The Intertidal zone is the narrow strip of land that lies between the highest and lowest tide lines. Intertidal sites are best viewed when the tide reaches its lowest levels (Sept 2016). Among the shells collected at the beach was the Knobbed Whelk (*Busycon carica*). It was the largest shell found, ranging a size of 0.2 meters long. Whelks are predatory gastropods that surround bivalves with its muscular foot, which exerts a pulling force and opens the shell by suction. Then the whelk inserts its long proboscis to consume the prey (Douglass 1989).

**Methods:**

In order to collect the Mollusk shells, the change in the tides had to be recorded simultaneously. On the day of the experiment, high tide was at 11:56 am. Arrival time was at 1:05 pm and the experiment officially started at 1:15 pm. A line was drawn in the sand alongside the original high tide line with a length of 6 meters. Using measuring tape, the width lines for the box extended to 5 meters downhill to where the tide line stood at 1:20 pm. One hour later, Box B was laid out and 5 more meters of water had gone out. At 3:20 pm, Box C was drawn out and the same thing occurred, 5 meters of water had vanished. Finally, 30 minutes later, a fourth and final box was drawn in the sand and only 2 meters of water went out with the tides. After each box was drawn, and the tide was going out, the shells were found within each one.

**Results:**

Bivalves outmatched Gastropods in abundance within the tide boxes. The Bivalves made up 64.4 % of the specimens collected, while Gastropods comprised on 35.6 %. The Atlantic Bay Scallop (28.9 %) and the Eastern Oyster (24.4%) were the dominant Bivalve species found in the area, with a total of 13 and 11 individual specimens found. The Shark eye (20.1 %) was the dominant Gastropod species found and the third most abundant species (Table 1).

**Table 1:** Quantity of Shells and Classes

| Shell Type | Scientific Name | Quantity | Class | Percent |
|---|---|---|---|---|
| Atlantic Oyster Drill | *Urosalpinx cinerea* | 6 | Gastropod | 13.3% |
| Knobbed Whelk | *Busycon carica* | 1 | Gastropod | 2.2% |
| Shark eye | *Neverita duplicate* | 9 | Gastropod | 20.1% |

| | | | | |
|---|---|---|---|---|
| Ribbed Mussel | *Geukensia demissa* | 2 | Bivalve | 4.4% |
| Atlantic Bay Scallop | *Argopecten irradians* | 13 | Bivalve | 28.9% |
| Eastern Oyster | *Crassostrea virginica* | 11 | Bivalve | 24.4% |
| Soft-shelled Clam | *Mya arenaria* | 3 | Bivalve | 6.7% |

| **Table 2:** Tide Times | | |
|---|---|---|
| Tide Time | Water Lost | Box |
| 11:56 am | 0 m | High tide |
| 1:20 pm | 5 m | Box A |
| 2:20 pm | 5 m | Box B |
| 3:20 pm | 5 m | Box C |
| 3:50 pm | 2 | Box D (low tide) |

**Discussion:**

Most of the Mollusk shells collected are native to Long Island. Some of them, including the Atlantic Bay Scallop can be found as far north as the Arctic to as far south as Florida (Sept 2016). Others like, the Eastern Oyster can be found as far south as the West Indies and the Gulf of Mexico (Douglass 1989). Variations in the range between high and low tides over a monthly cycle are caused by the combined influence of the Sun and Moon (Cousteau 2006).

**Conclusion:**

The dominant species surveyed from the coastline of Northport Bay were the Atlantic Bay Scallop (*Argopecten irradians*) and the Eastern Oyster (*Crassostrea virginica*). The Atlantic Bay Scallop was the most commonly found, with a total of 13 out of 45 individuals Mollusks identified. Bivalves made up 64.4 % of the specimens collected, while Gastropods comprised 35.6 %. After observing the tides, it was measured that it takes 1 hour for the tide to go out by 4.6 meters.

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# MC1R Variant Detection Assay to Determine Ageing Rate and Potential Skin Carcinoma Predispositions

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**Keywords:** Biology, Genomics, Ageing, Skin Cancer

**Abstract:**

Through the use of genomics, genetic variants can be detected in the gene MC1R, which is significant because a mutation at this site could be an indication of a quicker aging process and a heightened risk for skin carcinoma. The amino acid change Asp294His as found in dbSNP (rs1805009), was found to be a strong link in the detection of one of the most dangerous mutations of the MC1R gene. The dbSNP rs1805009 leads to two common amino acid changes, one being from D > H and the other being D > N; this assay will focus on the effects of the amino acid change D > H due its more damaging results, however, changes for amino acid change D > N will also be shown for reference. Bioinformatics was used to find the gene sequence, protein sequence, level of conservancy of the SNP, damage levels of the gene mutation, to create primers for the assay, as well as the optimal conditions needed to test the efficiency of the restriction enzymes needed to detect the presence or absence of the mutation. The necessary protocol for the use of PCR for the assay was determined and recorded. Our results show differences in the protein conformations among the sequences with the amino acid mutations. The restriction enzyme Taq1 can be used to cut the sequence, so that the sequence becomes 116 and 65 base pairs.

**Introduction:**

Genomics is the study and mapping of genomes, whether it be in an individual or in a population. A genome is the complete set of DNA belonging to an organism (Ginsberg and Willard 2010). Genotyping uses assays, sequencing, or microarrays to find the genetic variants in an individual's DNA. These variations in sequences are identifiable through reference sequences found in the genome browser (http://genome.ucsc.edu). Advancements in sequencing technology has allowed for an individual's DNA to be sequenced easily and cheaply, so it is becoming more common that genomic information can be used to predict disease risk, therapeutic outcome, and even inheritable features and traits such as skin and eye color. The successes of genomic sciences have led to the emergence of the field of personalized medicine. Genomics has maximized individual patient therapies by using biomarkers to reveal genetic information that can facilitate medical decision making during the assessment of diseases such as during the diagnosis of carcinoma. Understanding genomics further may cause a shift in health care to a more comprehensive approach that looks at individual risks and guides clinical decisions. Here we attempt to create a genotyping assay for MC1R, a gene associated with the production of melanin.

The MC1R gene encodes for the melanocortin-1 receptor that is located on the surface of melanocytes which are the cells that produce the pigment, melanin, on the skin. A change in the α-MSH (α-melanocyte-stimulating hormone) can lead to decrease in adenylyl-cyclase and tyrosinase activity (Vashi *et al*. 2016). The study showed that people with darker skin tones had a higher tyrosinase activity than those with fairer skin tones. This pigment gives people their skin color, and also doubles as a bodily protective mechanism against sun damage. In a study by Latreille *et al.* (2009), women with the amino acid change to Asp294His, (dbSNP rs1805009) have lower levels of functional melanin; the change Asp294His is also referred to as D > H in the results section of this assay. In a study by Rees (2000), MC1R variants increase susceptibility to Melanoma. Melanoma is the most serious type of skin cancer. People with a MC1R variation are at the highest risk for the development of this melanoma. In addition to being a defensive mechanism in the body to combat the free radicals that come from sun exposure, various research suggests that 80-90% of how young or old an individual looks is due to sun damage. In people with fairer skin tones and higher susceptibility for skin damage or cancer, the MC1R gene is usually expressed in a mutant form compared to someone with much darker skin tone.

There are two types of melanin that can be produced in melanin production eumelanin and pheomelanin. Eumelanin is the form of melanin that is associated with protection of the skin cells and darker pigments. In a study by Maarten *et al.* (2001), it suggests that an increase pheomelanin can lead to carcinoma. In essence, the conversion from eumelanin to pheomelanin, leading to red hair and fair skin, can be an indication of loss of function at the MC1R gene.

Differences in melanin composition and distribution are associated with different rates of skin aging (Vashi *et al.* 2016).We hypothesize that a person who has a variant of MC1R will have lower levels of melanin, age faster, and may benefit from targeted skin care for those predisposed to premature aging, and skin cancer. Since this variant is so important not only to aging, but to identifying those individuals susceptible to melanoma, we have attempted to create a functional genotyping assay for the variant Asp294His, (dbSNP rs1805009) to help identify whether an individual has variant that make them more susceptible to melanoma and can advise those to use sunscreen, as well as increase screening for skin cancers, possibly saving their life.

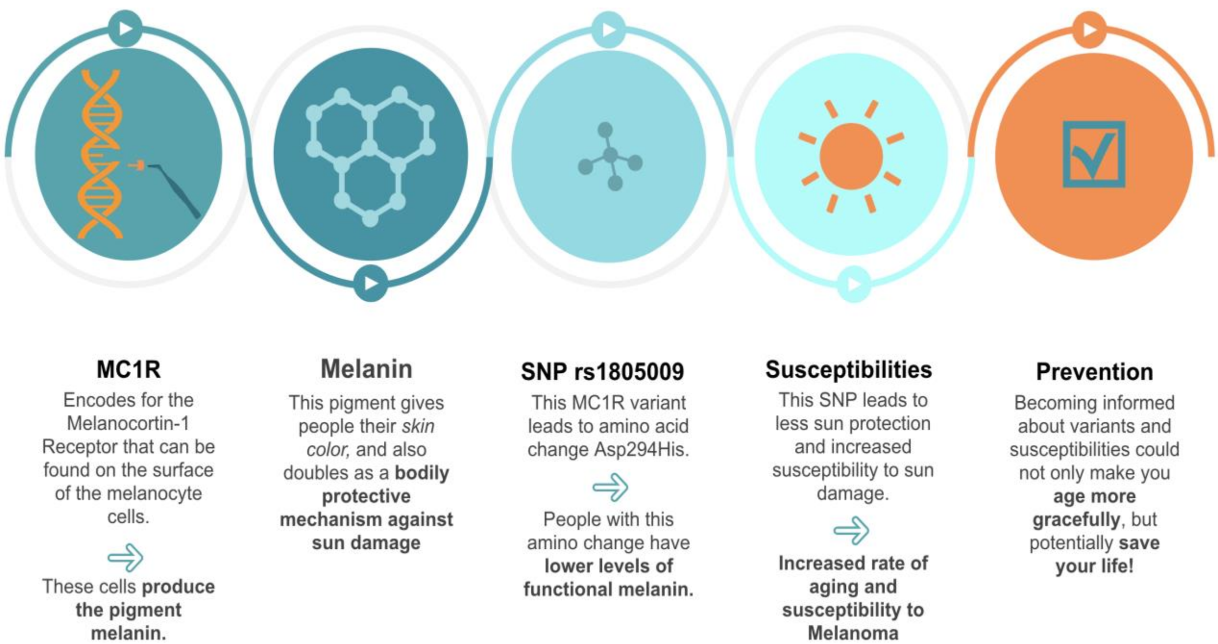


**Figure 1**: Overview of the MC1R gene and the effects of the SNP rs1805009.

**Materials & Methods**

*Bioinformatics*

The following Bioinformatic tools were used in the generation of the genotyping assay:
The University of California Santa Cruz (UCSC) Genome Browser was used to find the nucleotide gene sequence, and protein sequence of MCIR as well as the level of conservancy of the SNP. (http://genome.ucsc.edu) PolyPhen-2 (Polymorphism Phenotyping v2) was used to determine whether or not the mutation was damaging. (http://genetics.bwh.harvard.edu/pph2/). The National Center for Biotechnology Information (NCBI) database of genetic variation (dbSNP)

(https://www.ncbi.nlm.nih.gov/snp/) was used to find the common and most damaging mutations to the MC1R gene, and rs1805009 was chosen based on a through comparison of SNPs. MUpro: Prediction of Protein Stability Changes for Single Site Mutations from Sequences was used to prediction of the stability changes in the protein in this single site mutation. (http://mupro.proteomics.ics.uci.edu/) New England BioLabs NEBCutter V 2.0 was used to observe that when both variations of the mutation was present, the restriction enzyme, Taq1, was not (http://nc2.neb.com/NEBcutter2/). Primers for Polymerase Chain reaction were determined using Primer3Web.http://primer3.ut.ee/). A letter count website was used to determine the number of nucleotides before and after the mutation site necessary for, both, left and right primers (https://www.lettercount.com/). The optimal condition for the restriction enzyme used in our assay (Taq 1) was found on the thermofisher website (http://thermofisher.com).

*Genotyping Assay:*
We would use the Polymerase chain reaction (PCR) protocol (From Qiagen, Germantown, MD) to develop a 25 µl reaction of Qiagen Master Mix 12.5 µl Master Mix, 0.5 µl Primer L, 0.5 µl Primer R, 0.5 µl genomics DNA at 100ng/µl, 10.5 H20.
A thermocycler was then used to run the PCR 95°C for 5 min, 30- 40 cycles of (95°C for 15 sec, 60°C for 30 sec, and 72°C for 30 sec) followed by a 72°C for 10 min and a 4°C hold. Restriction Enzyme Protocol: Follow protocol for Taq1 from thermofisher Scientific (Waltham, MA) exactly with an optimal reaction temperature is 65°C.
Gel electrophoresis: Samples were run on a 1% agarose gel for 20min. Visualized/using Alpha imager.

**Results**

Rs 1805009 is a deleterious SNP located in the MC1R gene and has a major allele of Gly and two minor alleles of Ala and Cys. MC1R codes for the amino acid Asp, but rs 1805009 can change it to Asn or His. This SNP is found in more than 1% of the population and is conserved and presents as an Asp across all species. The Phyre2 results show that the change in amino acids results in a different protein conformation (See Figure 1). Mupro predicts that the Asp to His mutation occurs at position 294 and decreases the stability of the protein structure with a delta G of -1.1114854. It shows that the Asp to Asn mutation also occurs at 294 with a delta G value of -1.223514. PolyPhen-2 predicts that this mutation probably damaging, with a score of 1.00 (See Figure 3). The results from Primer3 indicate that the Left Primer is TCACACTCATCGTCCTCTGC, the Right Primer is GAGCATGTCAGCACCTCCTT, and the restriction enzyme is Taq1. Our primers amplify a sequence that is 317 base pairs. After it is cut with a restriction enzyme it will be 116 base pairs and 65 base pairs, indicating that the variant is not present. On a gel electrophoresis two fragments one that is 116 base pairs and the other that is 65 base pairs long will resolve on a gel and identify someone without the variant. If the variant is present the restriction enzyme Taq1 will not cut at the site. On a gel electrophoresis a fragment that is 317 base pairs long will be the result. This will help identify the reference and variant by cutting at the amino acid that is changed by the mutation.

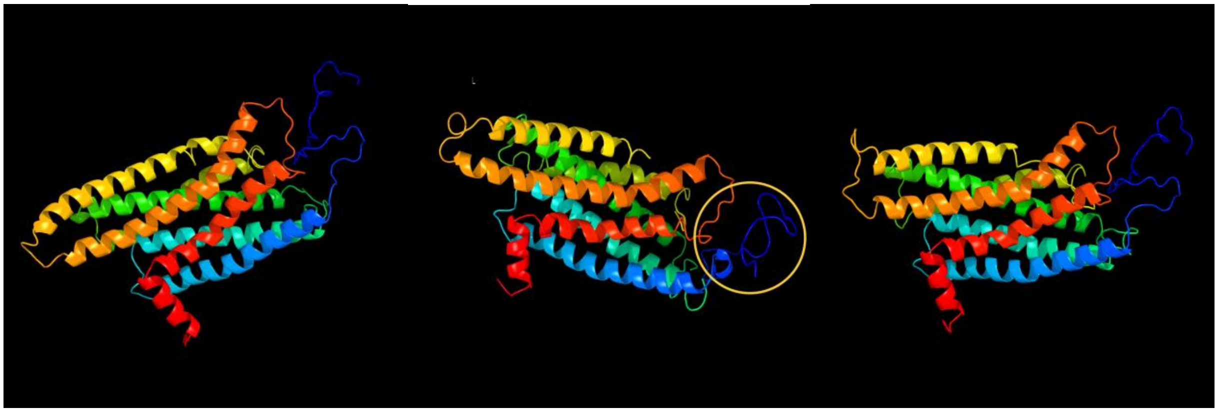

**Figure 2A** **Figure 2B** **Figure 2C**

**Figure 2A**: Model of normal protein sequence.
**Figure 2B:** Model of protein with an amino acid change from D to H at position 294. This model shows a difference in the coiling of the protein compared to the original sequence. The structure of the portion represented in dark blue seems to have a compromised folding conformation.
**Figure 2C:** Model of protein with an amino acid change from D to N at position 294. This model shows no major changes in protein conformation from the original amino acid sequence. The yellow coil can be said to have a truncated conformation.

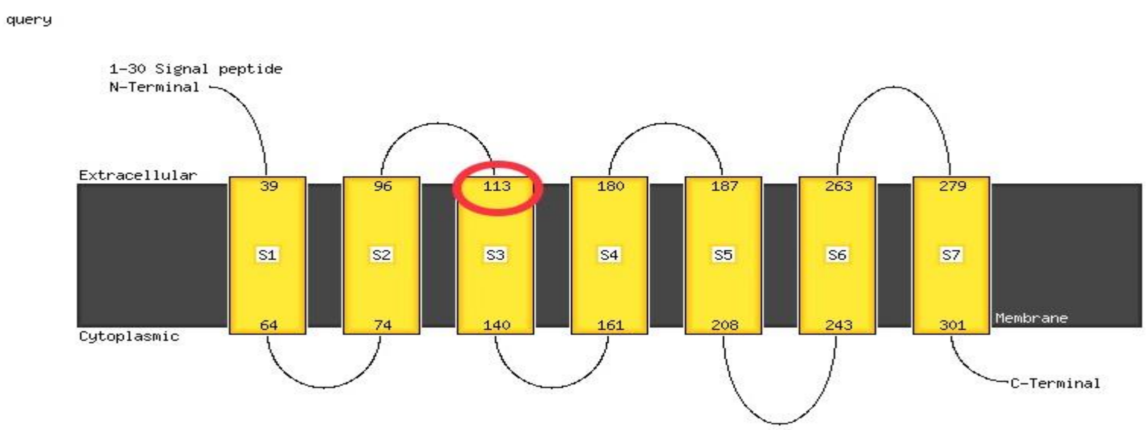


**Figure 3A**

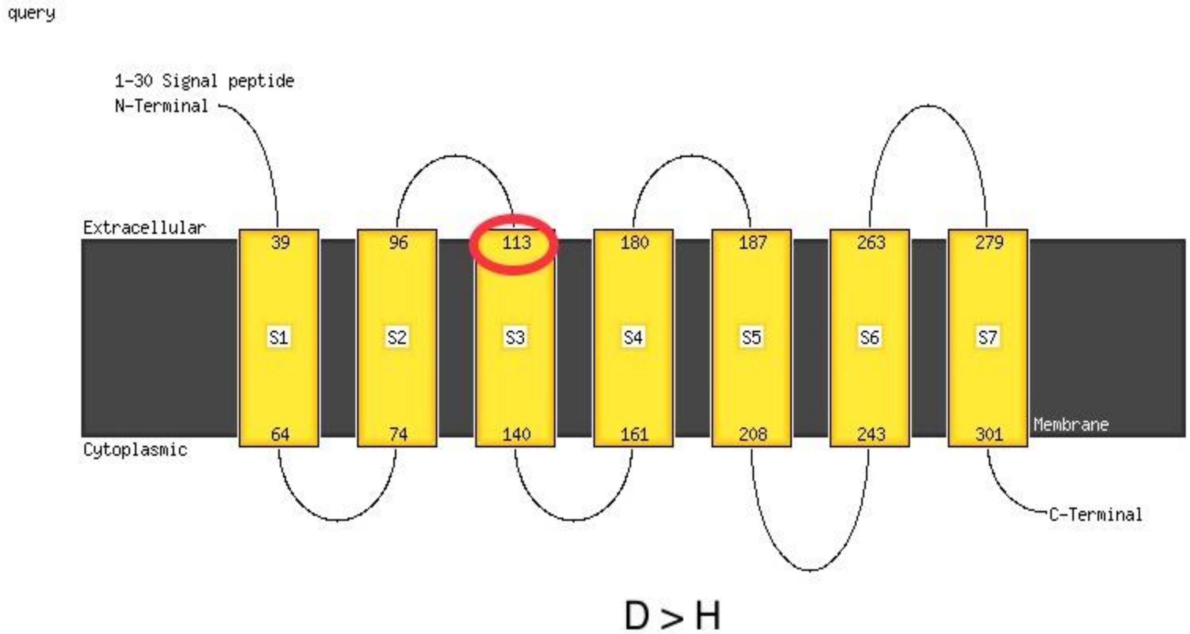


**Figure 3B**

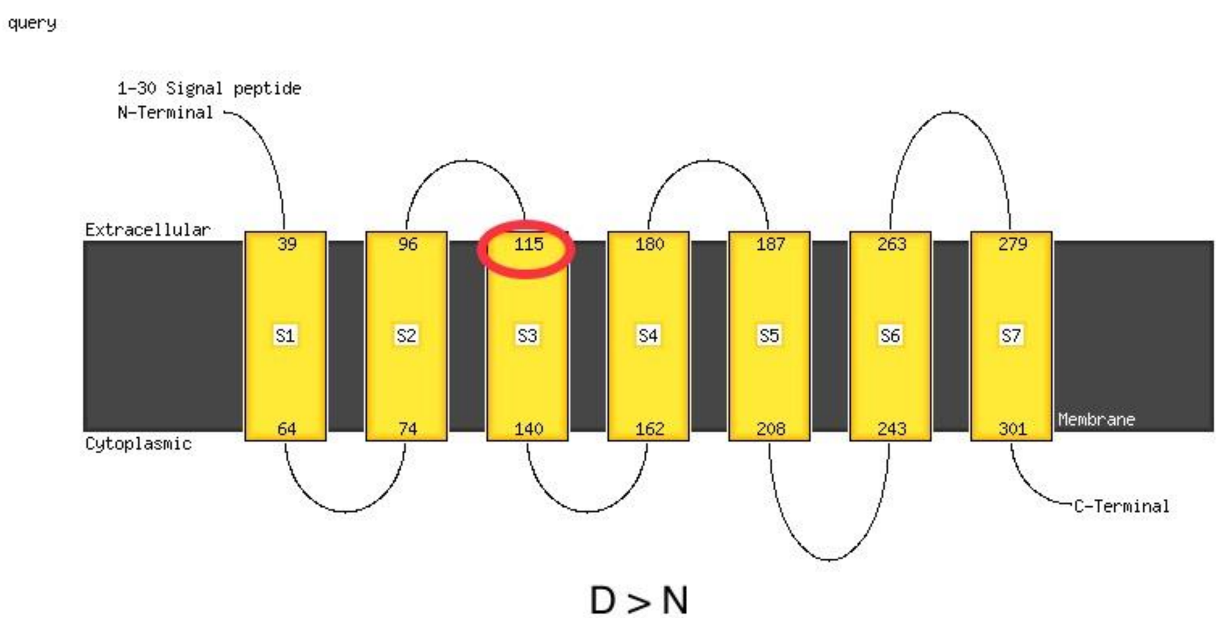


**Figure 3C**

**Figure 3A:** Shows the 7-transmembrane helixes of the unchanged protein sequence.
**Figure 3B:** Shows the 7-transmembrane helixes of the protein sequence where D was changed to H.
**Figure 3C:** Shows the 7-transmembrane helices of of the protein sequence where D was changed to N.

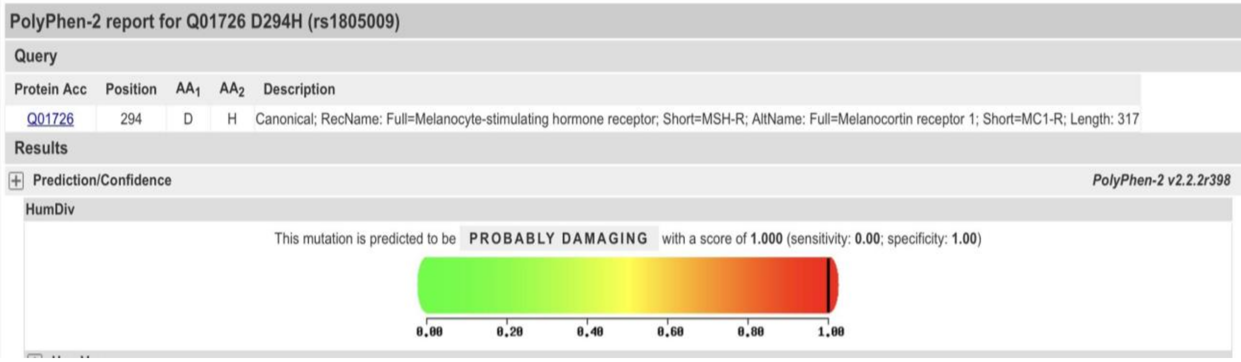


**Figure 4:** Results from PolyPhen-2 predicts that the mutation is probably damaging, with a score of 1.00.

Results have shown a change from D to H in the position of 294 of the protein sequence. Results for the amino acid change from D to N at the same position were not able to be determined, possibly due to a less common and scientifically understood amino change due to a mutation at the site of this gene for the rs1805009 SNP.

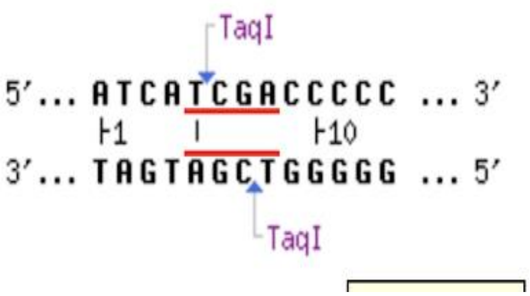


**Figure 5A**


**Figure 5B**


**Figure 5C**

**Figure 5A:** Results from NEBCutter of the sequence without the SNP showing that the restriction enzymes are present.
**Figure 5B:** Results from NEBCutter with the amino acid changed from G to A showing the restriction enzymes are not present.
**Figure 5C:** Results from NEBCutter with the variant sequence that changed G to C. The restriction enzymes are not present in these results.

**Discussion**

SNPs or single nucleotide polymorphisms, are conserved across species which shows that the specific gene, in our case MC1R or "Melanocortin 1 Receptor", is not a lethal SNP and that it has managed to continue to get passed down for generations. MC1R is a melanin activating receptor peptide. It has a role that correlates with skin, hair color, sun sensitivity, and genetic risk factor tied to melanoma. As a conserved SNP, its function remains relatively unchanged from evolutionary change. In regards to MC1R, its main function is mainly to control skin pigmentation and other secondary characteristics like red hair in other variants (rs1805009). However, variant rs1805009 contains possible risk factor for melanoma. Polyphen2, has predicted that the variant is "probably damaging" due to an amino acid substitution at position 294 from amino acid D to H. However, when trying to find the second substitution of D to N there was an error causing Polyphen 2 programming to not show the specific amino acid substitution. Using Mupro, a decrease protein stability was found showing a decrease in function that will occur when the rs1805009 variant is inherited by an individual. Therefore, the rs1805009 variant in the MC1R gene, will affect overall melanin pigmentation. In turn, a person with this variant, is at risk showing increased signs of aging and risk for melanoma.

A Genotyping Assay of the MC1R gene is beneficial toward personalized medicine because of the ability to see these variations that can show genetic susceptibility to certain genetic conditions. The assay shown above is already an indication (mutation prediction) that rs1805009, which codes for skin/hair/eye pigmentation, red hair/fair skin, also contain a missense variations for melanoma. An assay can help provide a personalized risk assessment, allowing individuals to work with physicians and geneticists to create a personalized treatment plan or preventative measures to combat any possible risk that may occur in patients who expresses rs1805009. As found through bioinformatics, a variant in the MC1R gene can be an indication of lower levels of functional melanin and can be likely damaging to one's integumentary health.

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# Linden Trees and Red Cedar Trees are Dominant Species in Mid-Island Western Suffolk County

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**Keywords**: Linden, Red Cedar, Blydenburgh, Brentwood, Farmingdale, Suffolk, dominant

**Abstract**:

In this experiment 120 trees were surveyed in Blydenburgh County Park, as well as in two residential areas in Brentwood and Farmingdale, NY. The trees were identified using dichotomous keys. 49% of the trees that were found were Red Cedar Trees, and Linden Trees making them the dominant tree species in mid-island Western Suffolk County.

**Introduction**:

This experiment was conducted in Nassau and Suffolk counties to see what tree species were the most dominant. We used several dichotomous keys to help us identify different tree species in the native area. According to Long Island Weather (2020), Long Island has a climate that is very similar to other coastal areas of the Northeastern United States. For example, it has warm, humid summers and cold winters, but the Atlantic Ocean helps bring afternoon sea breezes that temper the heat in the warmer months and limit the frequency and severity of thunderstorms. Also, in the wintertime, temperatures are warmer than areas further inland (especially in the night and early morning hours), sometimes causing a snowstorm further inland to fall as rain on the island. However, measurable snow falls every winter, and in many winters one or more intense storms called nor'easters produce blizzard conditions with snowfalls of 0.30-0.61 meters and near hurricane force winds. Temperatures in Nassau and Suffolk are similar. The winter average for Nassau is 0.94 ºC, compared to a summer average of 22.6 ºC. In Suffolk, the winter average is 0.22 ºC and summer average is 22.2 ºC. The Nassau area receives about 114.3 centimeters of rain, compared to 106.7 centimeters for Suffolk. Snow falls at about 68.3 centimeters per year in Nassau and 76.2 centimeters for Suffolk (Long Island Weather, 2020). We are looking to see how diverse the tree species in such areas are & which are to be more dominant and withstand these different weather conditions. As we look for these, we also measure the tree trunks to see approximately how old they may be.

**Methods**:

In this study, we surveyed a total of 120 trees. Specimens of 120 tree branches were retrieved from different parts of Blydenburgh County Park, Brentwood, and Farmingdale. We preformed tree surveys in three different locations. These were tree surveys in which every tree in each given square were identified. We first surveyed 32 trees in three residential areas in Brentwood, NY, then we surveyed 49 trees in one residential area in Farmingdale, NY, and finally we surveyed 39 trees in two areas in Blydenburgh County Park, NY. Each square where we measured were about 4046.86 square meters in size. We identified all the trees in all of the areas we surveyed. We then used a couple of dichotomous keys which include (Cope and Winch Jr. 2002), (Seiler and Peterson 2020), (Thang 2019), and (Missouri Botanical Garden 2020) to confirm their identification. We then used (Apple Inc. 2016) to find out the coordinates of the areas we visited. We also used Google maps (Google Corp., 2020) and

Latitude and Longitude Finder (LatLong.net**,** 2020) to find out the latitude and longitude of the different places that each tree was located in. After we gathered our data, we used a measuring tape to measure the circumference of all of the trees we surveyed. Once we confirmed the trees identifications, we placed them into tables and wrote their scientific names, measurements, and coordinates. At the end we decided to compare our findings to other students who were published in the *SATURN Journal* to test our hypothesis.

**Result:**

After collecting data and analyzing it through the dichotomous keys it was found that mid-island Western Suffolk County grew more Red Cedar trees and Linden Trees. Out of the 120 trees we analyzed Red Cedar trees and Linden Trees were both dominant in comparison to every other tree we measured. The tables below list every tree that we identified.

***Table 1:*** *Blydenburgh dog park trees identified (40º 50'06" N, 73º13'13" W)*

| **Name** | **Scientific Name** | **Quantity** | **Measurement** |
|---|---|---|---|
| Bur Oak | *Quercia-Macrocarpa* | 1 | 1: 0.25m |
| Sassafras | *Sassafras albidum* | 2 | 1-0.20m; 1-10m |
| Northern Red Oak | *Quercus rubra* | 2 | 1-0.25m; 1- 0.56m |
| Norway Spruce | *Picea abides* | 1 | 1-58m |
| Button Bush | *Cephalanthus occidentalis* | 1 | 1-15m |
| American Chestnut | *Monoecious deciduous* | 1 | 1-20m |
| Burning Bush | *Euanymus alatus* | 1 | 1-18m |
| Dahurian Buckthorn | *Rhamnus davurica* | 2 | 1-0.77m 1-0.05m |

***Table 2:*** *Blydenburgh picnic area trees identified (40º 83'68" N, 73º22'10" W)*

| **Name** | **Scientific Name** | **Quantity** | **Measurement** |
|---|---|---|---|
| Flowering Dogwood | *Cornus florida* | 1 | 1-0.66m |
| Northern Red Oak | *Quercia* | 3 | 1-2.7m; 1-0.25m; 1-2.5m |
| Mitten Tree | *Sassafras albidum* | 2 | 1-89m; 1-0.53m |
| Red Cedar | *Juniperus virginia* | 21 | 1-1.8m; 1-2.0m |
| Peach Tree | *Prunus persica* | 1 | 1-2.0m |

***Table 3:*** *Trees identified in Brentwood area #1(40º 76'93" N, 73º24'65" W)*

| **Name** | **Scientific Name** | **Quantity** | **Measurement** |
|---|---|---|---|
| Sugar Maple | *Acre saccharum* | 3 | 1-4.0m;1-4.17m;1-4.3m |
| Magnolia Kobus | *Magnolia kobus* | 1 | 1-2.3m |

***Table 4:*** *Trees identified in Brentwood area #2(40º 78'36" N, 73º25'28" W)*

| **Name** | **Scientific Name** | **Quantity** | **Measurement** |
|---|---|---|---|
| Japanese Maple | *Acer palmatum* | 2 | 1-0.48m; 1-0.50m |
| Pitch Pine | *Pinus rigida* | 2 | 1-1.37m; -1-1.27m |
| Sugar Maple | *Acer saccharum* | 2 | 1-1.91m;1-2.26m |

***Table 5:*** *Trees identified in Brentwood area #3(40º 78'74" N, 73º26'76" W)*

| Name | Scientific Name | Quantity | Measurement |
|---|---|---|---|
| Sugar Maple | *Acer saccharum* | 4 | 1-1.63m;1-2.21m 1-1.89m;1-1.65m |
| American Beech | *Fagus grandiflora* | 4 | 1-1.01m;1-1.32m;1-1.47m; 1-1.83m |
| Eastern Hemlock | *Tsuga canadensis* | 2 | 1-2.13m;1-2.26m |
| Japanese Maple | *Acer palmatum* | 1 | 1-0.51m |
| Pitch Pine | *Pinus rigida* | 5 | 1-1.02m;1-1.42m;1-0.81m;1-0.61m;1-0.81m |
| Northern Red Oak | *Quercus alba* | 2 | 1-0.10m1-0.80m |
| American Elm | *Ulmus americana* | 1 | 1-0.36m |
| Red Spruce | *Picea rubens* | 3 | 1-0.05m;1-0.15m;1-0.13m |

***Table 4:*** *Trees identified in Farmingdale area #1 (40º 42'51" N, 73º25'57" W)*

| Name | Scientific Name | Quantity | Measurement |
|---|---|---|---|
| Red Maple | *Acer rubrum* | 4 | 1-1.48m;1-3.0m;1-2.08m;1-1.60m |
| Gambel Oak | *Quercus gambelii* | 1 | 1-1.60m |
| Cornelian-Cherry | *Cornus mas* | 1 | 1-0.33m |
| Linden | *Tilia americana* | 33 | 2-1.50m;5-1.65m;8-1.93m;7-1.73m;4-1.45m;6-1.25m;1-1.40m |
| Weymouth Pine | *Pinus strobus* | 10 | 3-1.02m;2-1.22m;4-0.86m;1-1.09m |

**Discussion**:

In this study, Red Cedar and Linden trees were found to be dominant in mid-island western Suffolk County. Red Cedar is the most widely distributed conifer of tree size in the Eastern United States and is found in every state east of the 100th meridian (Lawson, 1985). The species extends northward into southern Ontario and the southern tip of Quebec (Lawson, 1985). The range of eastern Red Cedar has been extended, especially in the Great Plains, by natural regeneration from planted trees (Lawson, 1985). After comparing this study to others done on Long Island in the past, there were many similarities, there have also been many differences. According to past study of Brown and Banks (2017) concluded that it the areas of Nassau and Suffolk Counties Eastern White Pines were dominant in the area, yet after three years there have been an increase of Red Cedar and Linden making them a more dominant species. Although Red Cedar is generally not considered to be an important commercial species, its wood is highly valued because of its beauty, durability, and workability (Lawson, 1985). The number of trees and volume of Red Cedar are increasing throughout most of its range (Lawson, 1985).

**Conclusion**:

We hypothesized that Red Cedar trees and Linden trees would be the most dominant species. After collecting all of our data, we were able to see that the Red Cedar and Linden trees were the most dominant species in mid-island Suffolk County. 49% of the trees were found to be Red Cedar and Linden trees.

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# The European Larch (*Larix decidua*) and the Red Spruce (*Picea rubens*) are Dominant Tree Species in Smithtown, New York

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**Keyward:** Smithtown, Species, Diversity, Human Activity

**Abstract:**

Forty different tree samples were collected in two residential properties of Smithtown, NY. Ten overall tree species were identified using two online dichotomous keys. The two dominant species found at the first location were the European Larch (*Larix decidua*) and the Red Spruce (*Picea rubens*). The two species were also found at location two, but were not as frequently found in comparison to the non-dominant species. The overall results showed that there is a greater diversity of species further from human activity.

**Introduction:**

The hypothesis of this study was that there is a greater diversity of tree species further from human activity. The two residential properties surveyed in this study are located in Smithtown, NY. There were twenty tree samples collected at location one and twenty tree samples collected at location two. The area of Smithtown typically has warm and humid summers, and cold, wet, and windy winters (WeatherSpark, 2016).

The dominant species found through the survey were the European Larch (*Larix decidua*) and the Red Spruce (*Picea rubens*). The non-dominant species found in this survey were: Red Maple (*Acer rubrum*), Atlantic White-Cedar (*Chamaecyparis thyoides*), White Ash (*Fraxinus americana*), Eastern Cottonwood (*Populus deltoides*), Pin Oak (*Quercus palustris*), Blue Spruce (*Picea pungens*), Staghorn Sumac (*Rhus typhina*), and Virginia Pine (*Pinus virginiana*).

**Method:**

In Smithtown, tree surveys were collected from two different residential properties. The species were identified and confirmed using *The vTree App. for iPhone* (Virginia Tech, 2020) and the *Tree Identification Key* (NY State Department of Environmental Conservation). The latitude, longitude, and height above sea level for both locations were found using Latitude and Longitude Finder (LatLong.net, 2020), and Google Earth (Keyhole, Inc., 2020) . Location One is found at a latitude of 40.85391695, a longitude of -73.24720217, and is 42 meters above sea level. The land of location one is 1416.4 square meters in size, according to the owner's property records, and contains an abundance of plant life. Location Two is found at a latitude of 40.86576163, a longitude of -73.24706293, and is 26 meters above sea level. The land of location two is 1456.868 square meters in size, according to the owner's property records, and has an abundance of plant life as well. A table was created for each property to keep record of the tree names, scientific names, and quantities found in each square of the survey (Tables 1 and 2). A 2x2 Contingency Table (Table 3) was used to track the amount of dominant (European Larch and Red Spruce) versus non-dominant (all others) species found on the properties. By comparing the data collected in this survey to the content provided in other studies in the area, it became clear that there is a greater diversity of tree species further from human activity.

**Results:**

After collecting and analyzing the data and information obtained through this survey, it was observed that the European Larch (*Larix decidua*) and the Red Spruce (*Picea rubens*) species were dominant in comparison to the total trees surveyed. It was also observed that the same few species were consistent on both properties, which had regular human activity. Through comparisons between the data collected in this survey with that of others, it became noticeable that there is a greater diversity of species further away from human activity.

At location one, twenty trees were observed in total. All of the trees surveyed were native to the area. The most common species found were the European Larch (*Larix decidua*) and the Red Spruce (*Picea rubens*), both with a count of six trees. At location 2, twenty trees were observed in total. All of the trees surveyed were native to the area. The most common species found were also the European Larch with five trees, and the Red Spruce with 4 trees.

**Table 1: Tree Species Found at Location 1**

| **Name of Tree** | **Scientific Name of Tree** | **Quantity Found** |
|---|---|---|
| Red Spruce | *Picea rubens* | 6 |
| European Larch | *Larix decidua* | 6 |
| Atlantic White-Cedar | *Chamaecyparis thyoides* | 2 |
| White Ash | *Fraxinus americana* | 1 |
| Pin Oak | *Quercus palustris* | 1 |
| Red Maple | *Acer rubrum* | 2 |
| Eastern Cottonwood | *Populus deltoides* | 1 |
| Blue Spruce | *Picea pungens* | 1 |

**Table 2: Tree Species Found at Location 2**

| **Name of Tree** | **Scientific Name of Tree** | **Quantity Found** |
|---|---|---|
| European Larch | *Larix decidua* | 5 |
| Red Spruce | *Picea rubens* | 4 |
| Eastern Cottonwood | *Populus deltoides* | 2 |
| Atlantic White-Cedar | *Chamaecyparis thyoides* | 2 |
| Red Maple | *Acer rubrum* | 1 |
| Blue Spruce | *Picea pungens* | 2 |
| Virginia Pine | *Pinus virginiana* | 2 |

| | | |
|---|---|---|
| Staghorn Sumac | *Rhus typhina* | 2 |

A 2x2 Contingency Table was used to compare the amount of dominant (European Larch and Red Spruce) versus non-dominant (all others) species between both locations surveyed. The dominant species at location one was greater than the non-dominant species of the twenty total trees at that location. The dominant species at location two was less than the non-dominant species of the twenty total trees at that location. The dominant species were seen most frequently overall in comparison to the non-dominant trees. The Chi-square value was found to be insignificant at the five percent level of probability (P=0.9). Therefore, there is not a significant difference in the ratio of dominant to non-dominant trees between the two properties surveyed.

**Table 3: 2x2 Contingency Table**

| X | **Dominant Species- European Larch (*Larix decidua*) and Red Spruce (*Picea rubens*):** | **Non-Dominant Species- All other species:** | **Total:** |
|---|---|---|---|
| **Location One:** | 12 (6 Red Spruce and 6 European Larch) | 8 | 20 |
| **Location Two:** | 9 (4 Red Spruce and 5 European Larch) | 11 | 20 |
| **Total:** | 21 | 19 | X |

**Discussion:**

In my survey, the tree samples were all taken from two residential locations in Smithtown, New York. Jasmin et al. (2018) found that European Larch (*Larix decidua*) was the dominant tree species found at Belmont Lake State Park in Babylon, New York, making up 22.5% of the total tree species surveyed. This study found a very large diversity of tree species at the park as well, ranging from Atlantic White Cedar (*Chamaecyparis thyoids*) to White Pine (*Pinus strobus*), and even Tamarack (*Larix laricina*)  (Jasmin, Kalisah, Ari, Jasmine, 2018).

Two other studies from the *Science and Technology Undergraduate Research Notes (SATURN) Journal*, which were also conducted in Smithtown showed less of a diversity of species found in residential areas. Walberg et al. (2014) found Scarlet Oak (*Quercus coccinea*) and Eastern White Oak (*Quercus alba*) on residential properties in Smithtown (Walberg, Sax, Mian, Charles, Garcia, 2014), while Provenzano et al. (2019) found such as the Pitch Pine (*Pinus rigida*) and Norway Maple (*Acer platanoides*) in residential areas (Provenzano, Marino, Ahmad, 2019). When compared to the survey conducted at Belmont Lake State Park in 2018, my study and the other studies conducted on residential properties in Smithtown show less diversity of species than at a local park in Babylon.

**Conclusion:**

There were a total of 40 trees surveyed on this residential property in Smithtown, New York. The study showed that the European Larch (*Larix decidua*) and Red Spruce (*Picea rubens*) were the two dominant species found. However, there was no significant diversity of other tree species found at this location, as well as the two other residential locations from the *Science and Technology Undergraduate Research Notes (SATURN) Journal*. All of these residential properties are constantly exposed to human activity. When this data was compared to another study conducted at Belmont Lake State Park (Jasmin et al.2018), it became clear that there is in fact a greater diversity of tree species further from human activity as shown from the survey conducted at two residential properties in Smithtown, Long Island.

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# Rose of Sharon are Dominant in Central Long Island and Maples are Disburse on the North Shore

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**Keywords:** Long Island, dominant, Native, Non-native

**Abstract:**

We surveyed 56 trees on Long Island from the towns of Northport, South Huntington, Central Islip and Wyandanch using dichotomous keys. The types of trees were very diverse, but the most abundant tree was the Rose of Sharon. The Rose of Sharon tree was in one location in this study while we also had a wide spread of Maple trees from different properties. From the four different residential properties we identified Japanese Maple tree sample, Red Maple, and Norway Maple.

**Introduction:**

This study was conducted in Suffolk County, NY to see different species of trees that grow in the areas that were surveyed. Suffolk County has a humid subtropical climate, gets 1.2 meters of average of rain per year, an average of .7 meters of snow per year and there is on average 206 sunny days per year. The hottest month is July with an average temperature of 28 Celsius and the coldest month is January with an average of –5 Celsius (Sperling's Best Places 2019).

The Rose of Sharon is native to China and India. The name hibiscus is from an ancient Greek name for "mallow," because this plant was thought to resemble the mallow blossom. Many cultivars of this species have been introduced (Arbor Day Foundation 2019). The Rose of Sharon grows to a height of 2.5–3.7 meters and a spread of 1.9–3 meters at maturity (Arbor Day Foundation 2019). It produces 5-petaled, trumpet-shaped, single or double flowers that are white, pink, red, purple or violet. Japanese Maple is a small deciduous tree or large shrub with a broadly spreading crown. The plant can be grown as a small single-stemmed tree or large multiple stemmed shrub. The habit is rounded to broad-rounded, with a layered branching structure like flowering dogwood. Trees typically grow 4.5 to 7.6 meters (Bernheim 2019).

**Method:**

Tree samples were taken from Central Islip, South Huntington, East Northport and Wyandanch. The samples were then identified using the dichotomous key books including *Tree Finder: A Manual for The Identification of Trees by Their Leaves* (Watts 1998) and *Nature Study Guild Publisher and Pacific Coast Tree Finder: A Pocket Manual for Identifying Pacific Coast Trees* (Watts 1998). All samples were collected from residential properties. Once all the tree samples were identified, the students made a table to compare their data. In the table they included if the trees were native or non-native, the location, scientific name, and quantity of the trees. The tables list the longitude and latitude of the properties (Google Inc. 2005).

**Results:**

After identifying 56 trees, it has been found that in Suffolk County, Rose of Sharon made up 19.64% of the trees surveyed. This non-native tree to the US, was dominant in the area of Central Islip. The Japanese Maple tree is a non-native tree comprising 8.93% was dominant on different locations.

These areas are listed in the Table 2.

**Table 1**: Tree Species and Diameter by Location.

| | Property 1 | Property 2 | Property 3 | Property 4 |
|---|---|---|---|---|
| Longitude and Latitude | 40.8768° N, 73.3246° W | 40.7907° N, 73.2018° W | 40.8682° N, 73.4257° W | 40.75° N, 73.36° W |
| Town | East Northport | Central Islip | South Huntington | Wyandanch |
| Amount of trees | 14 | 18 | 14 | 10 |

**Table 2**: Tree Species by Location.

| Tree Type (Scientific Name) | Qty | Location | % | Native |
|---|---|---|---|---|
| Japanese Maple (*Acer palmatum*) | 5 | South Huntington and East Northport | 8.93% | No |
| Kousa Dogwood (*Cornus kousa*) | 2 | South Huntington | 3.57% | No |
| Eastern white pine (*Pinus strobus*) | 2 | East Northport | 3.57% | No |
| White Oak (*Quercus alba*) | 4 | East Northport | 7.14% | No |
| Chess Apple *(Sorbus aria*) | 1 | East Northport | 1.79% | No |
| Northern Red Oak (*Guercus rubra*) | 2 | East Northport | 3.57% | No |
| Common Spruce (*Piceas abies*) | 2 | East Northport | 3.57% | No |
| Black Cherry (*Pronus serotina)* | 1 | Central Islip | 1.79% | No |
| White Mulberry (*Morus alba*) | 1 | Cental Islip | 1.79% | No |
| European Hackberry (*Celtis australis*) | 1 | Central Islip | 1.79% | No |
| Southern Catalpa (*Catalpa bignonioidis walter)* | 1 | Central Islip | 1.79% | No |
| Crepe Myrtle (*Lagerstroemia indica*) | 1 | Central Islip | 1.79% | No |
| Red Maple (*Acer rubrum*) | 2 | Central Islip and Wyandanch | 3.57% | No |
| Rose of Sharon (*Hibiscus syiacus*) | 11 | Central Islip | 19.64% | No |
| Eastern Redbud (*Cercis canadensis*) | 1 | Central Islip | 1.79% | No |
| Norway Maple | 3 | Wyandanch | 5.36% | No |

| | | | | |
|---|---|---|---|---|
| *(Acer platanoides*) | | | | |
| Sycamore<br>(Platanus occidentails) | 3 | Wyandanch | 5.36% | No |
| Common Oak<br>(*Quercus robur*) | 2 | Wyandanch | 3.57% | No |
| Eurasian Aspen<br>(Populus tremula) | 1 | Wyandanch | 1.79% | No |
| Oregon Cranapple<br>(*Malus fusca*) | 1 | South Huntington | 1.79% | No |
| Evergreen Spindle<br>(*Eunymus japonicus*) | 1 | South Huntington | 1.79% | No |
| White Poplar<br>(*Populus alba*) | 1 | South Huntington | 1.79% | No |
| Netleaf Oak<br>(*Quercus rugosa*) | 1 | South Huntington | 1.79% | No |
| European Spindletree<br>(*Euonymus europaeus*) | 1 | South Huntington | 1.79% | No |
| Paradisa Apple<br>(*Malus Pumila*) | 1 | South Huntington | 1.79% | No |
| Common Box<br>(*Buxus Sempervirens*) | 1 | South Huntington | 1.79% | No |
| Flowering Dogwood<br>*(Cornus Florida*) | 3 | South Huntington | 5.36% | No |

**Discussion:**

In this study, Rose of Sharon was found to be dominant in the town of Central Islip, but Maples were more disperse in the towns of South Huntington, East Northport, Central Islip and Wyandanch. Dickran and Grosso (2019) found that non-native trees are dominant to native trees in Northport and Patchogue. Also, Ferry (2019) found the Maple is the Dominant Tree Species in Sunken Meadow State Park in Kings Park, New York.

**Conclusions:**

In total we surveyed 56 trees. From four residential properties we identified Japanese Maple (*Acer palmatum*), Red Maple (*Acer rubrum*), and Norway Maple (*Acer platanoides*). The locations that were surveyed were in East Northport, Central Islip, South Huntington, and Wyandanch. We concluded, based on the data that in Suffolk County, Rose of Sharon (*Hibiscus syiacus*) was a dominant species in the central plane of Long Island in Central Islip while Maples were dominant on the North Shore.

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