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

The fourth issue of *SATURN J.* included an article published by students at Molloy College regarding sweeteners and inflammation in macrophages, three additional articles from the microbiology course at SCCC, and a continuation of the *SATURN J.* tree survey. In addition, the abstracts from the 5 2014 Northeast Regional Sigma Xi Conference held at SUNY Old Westbury were presented.

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

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

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

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

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*

Effects of Dopamine and Serotonin on *Staphylococcus aureus* and *Escherichia coli* Growth

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Keywords: Neurobiology, Microbiology, Neurotransmitters, Bacteria

Abstract:

Bacteria and the topics of mood and psychosis are generally considered to be exclusive to their dichotomous fields of biology and psychology; however, a closer look at the human microbiome shows that there is a possible link between bacterial presence and neurotransmission. This study focused on two bacterial species: *Staphylococcus aureus* (gram-positive), and *Escherichia coli* (gram-negative). The effects of the neurotransmitters dopamine and serotonin on the bacteria were tested/measured to determine whether the chemicals inhibited or sparked growth in the bacteria. Growth inhibition testing, and disk diffusion sensitivity testing were used to analyze the effects of each neurochemical on the bacterial species. A positive correlation between increasing concentrations of serotonin with increasing colonies of *S. aureus* and *E. coli* was found.

Introduction:

Previous inquiries have found that bacteria possess the ability to produce chemicals that are dopaminergic in nature. This, accompanied by the fact that psychosis is typically accompanied by an increased risk of infection across a lifetime, leads to implications for a specific association between neurotransmitters and bacteria (Graham 2014).

Clinical studies involving the injection of probiotics from bacteria that produce gamma aminobutyric acid, a neurotransmitter known to reduce perceptions of stress, showed that daily injection significantly reduced anxiety-like behaviors and psychological distress among mouse and human models (Messaoudi et al. 2011).

It was predicted that the application of various concentrations of neurotransmitter solutions would yield results showing the efficacy of growth acceleration by the neurotransmitters on *S. aureus* and *E. coli.*

Methods:

To begin, 2mM and 20mM molar concentrations of dopamine and serotonin were made with water as a solvent. These concentrations were chosen as a starting point due to a lack of published research on this aspect of testing. Each bacteria was plated on LB agar medium six times, three for each neurotransmitter. The neurotransmitter solutions were then dispensed onto sterile, 6 mm diameter, Whatman Antibiotic Assay Discs and plated on the agar medium seeded with each bacteria. This was repeated for each bacteria while maintaining controls of absorption disks that contained distilled water. The cultures were then incubated for 24 hours at 37 degrees Celsius.

The zone of inhibition for each culture was measured and recorded after incubation. After the original tests were conducted, molar concentrations of dopamine and serotonin were increased to further the range of results for inhibition. The concentrations were increased to 100 mM and 200 mM for both chemicals, and 400 mM only for serotonin. The same test procedures were followed for each new concentration. All tests for each concentration were completed twice to ensure validity.

Growth inhibition tests were performed. The original stock solutions of 0.2 mM, 2 mM, and 20 mM

were diluted 1:1000. The only exclusion from this was the solution for dopamine and *S. aureus,* which was not diluted for the growth inhibition experiment.

Completing the growth inhibition experiment involved the addition of a Phosphate Buffer Solution (PBS) to distilled water, and then the addition of 10 microliters of neurotransmitter solution to each vial of PBS and water. One mL of bacteria solution was added to each vial. The solutions were then mixed and one mL of the solution was dispensed and plated onto LB agar medium and incubated for analysis of growth inhibition. To test growth inhibition the bacterial colonies present in each culture were counted and recorded for comparative analysis. All tests for growth inhibition were completed twice and averaged to ensure validity.

Results:

For the Zone of Inhibition experiment the results for each bacteria and neurotransmitter can be found in the following graphs:

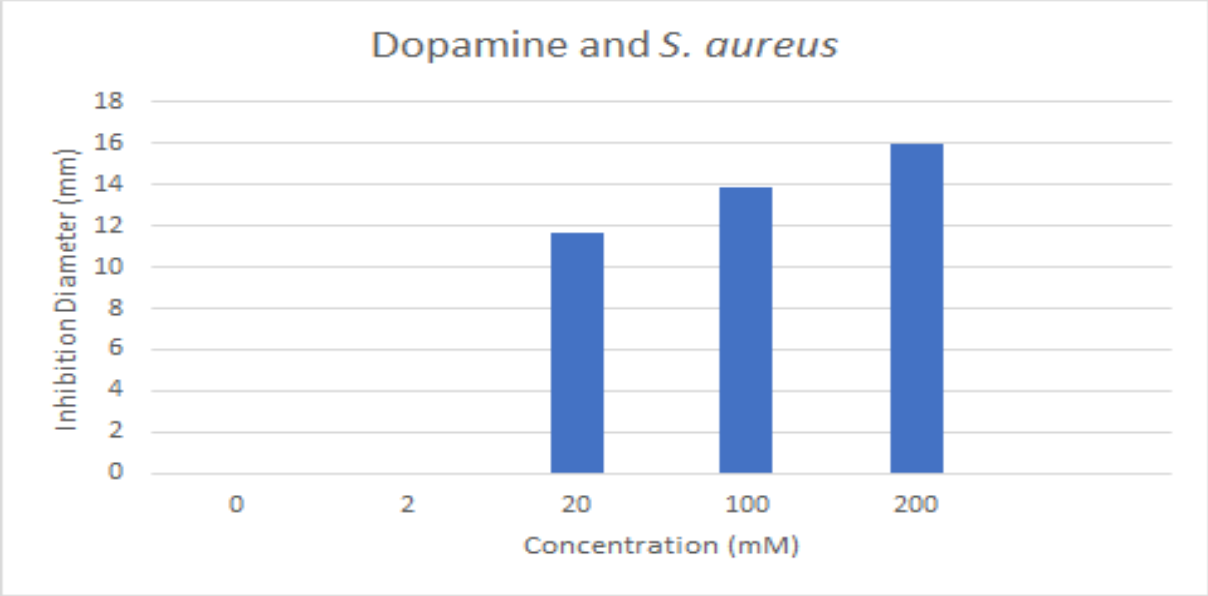

Figure 1: Dopamine and *S. aureus*

When treated with 20 mM of dopamine, *S. aureus* was found to have an inhibition diameter of 11.3 mm. 100 and 200 mM solutions of dopamine produced an inhibition diameter of 13.9 and 15.9 mm, respectively.

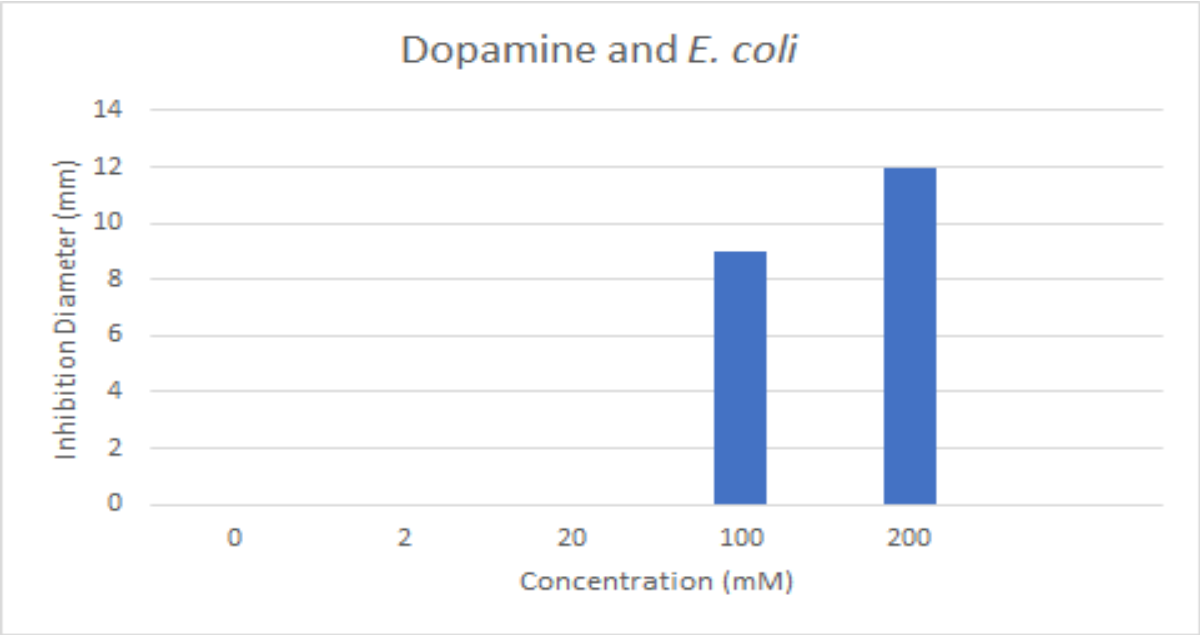

Figure 2: Dopamine and *E. coli*

Figure 2 depicts a lack of inhibition for 2 & 20 mM concentrations of dopamine on *E. coli.* At 100 mM an inhibition diameter of 8.7 mm was found. At 200 mM an inhibition diameter of 12 mm was measured.

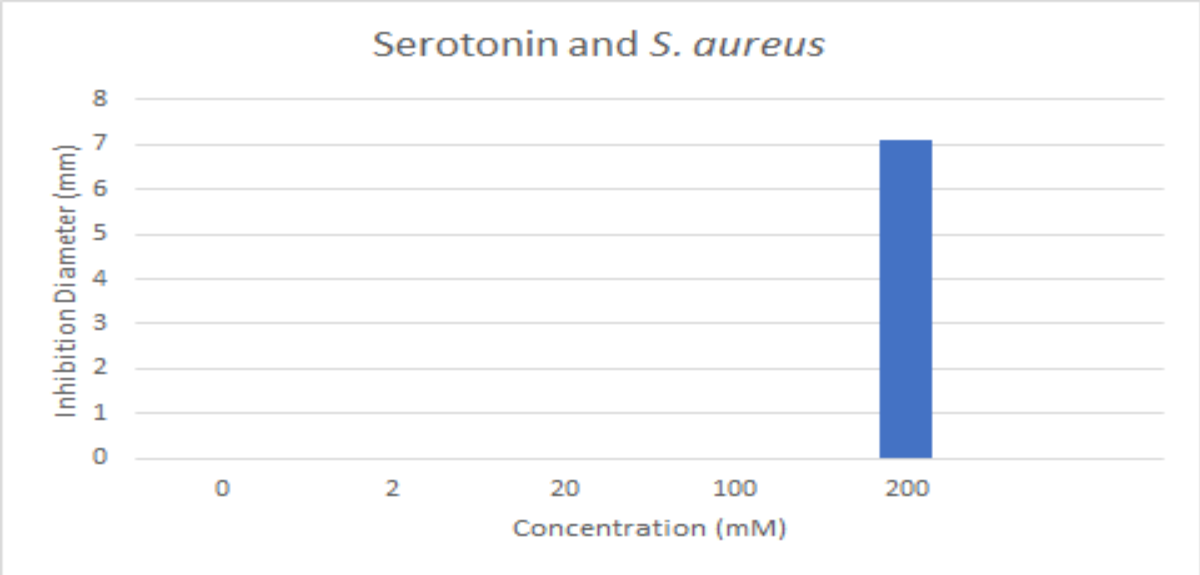

Figure 3: Serotonin and *S. aureus*

Until the 200 mM mark, no growth inhibition was detected among the culture. An inhibition diameter of 7.05 was found at 200 mM of serotonin.

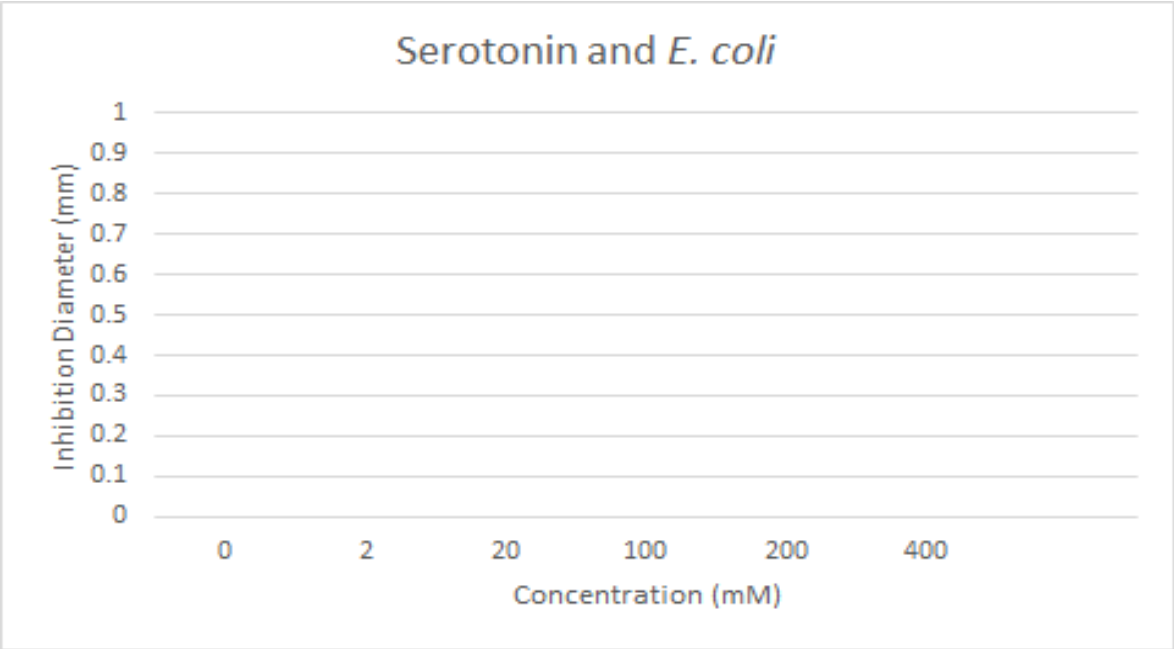

Figure 4: Serotonin and *E. coli*

No sign of inhibition was found when *E. coli* was treated with a range of concentrations of serotonin.

The results for the Growth Inhibition tests can be seen in the following graphs:

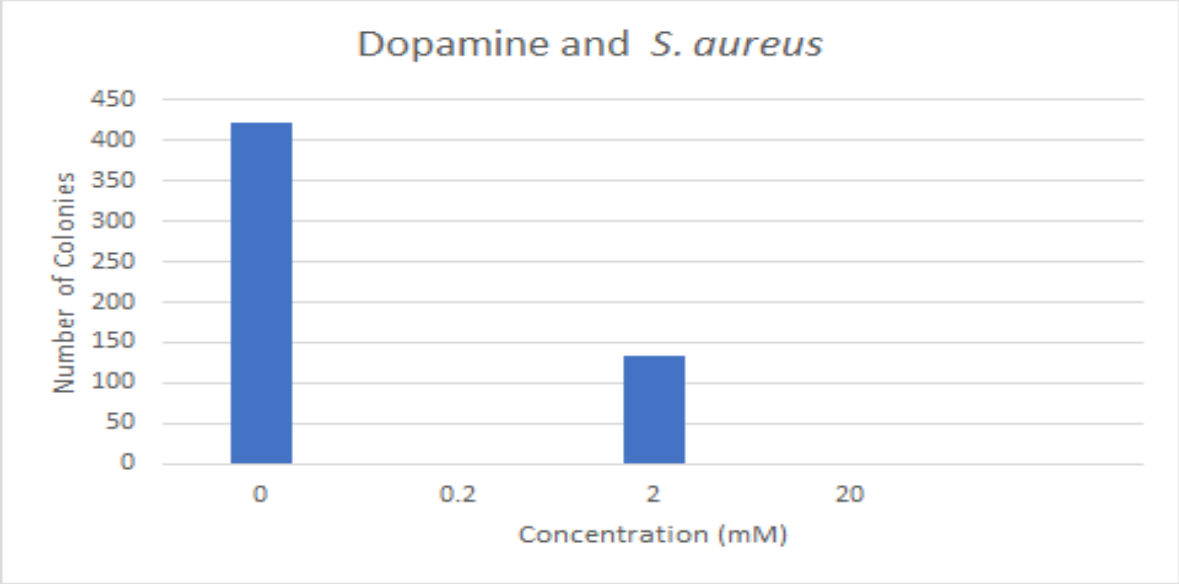

Figure 5: Dopamine and *S. aureus*

Concentrations of .2 mM and 20 mM dopamine applied to *S. aureus* produced no colony growth. The 2 mM solution yielded a colony count of 137, which was less than the control at 421 colonies.

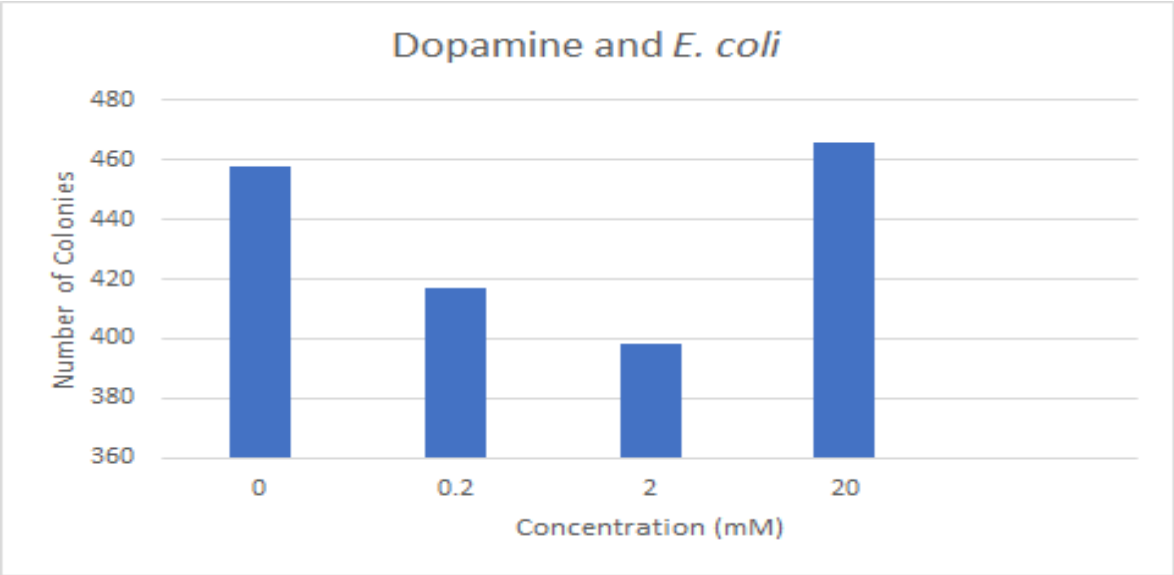

Figure 6: Dopamine and *E. coli*

Figure 6 depicts a decrease in colony number for 0.2 mM (417), a subsequent further decrease in colony number for 2 mM (395), and an increase in colony number for 20 mM (464), relative to the control (456).

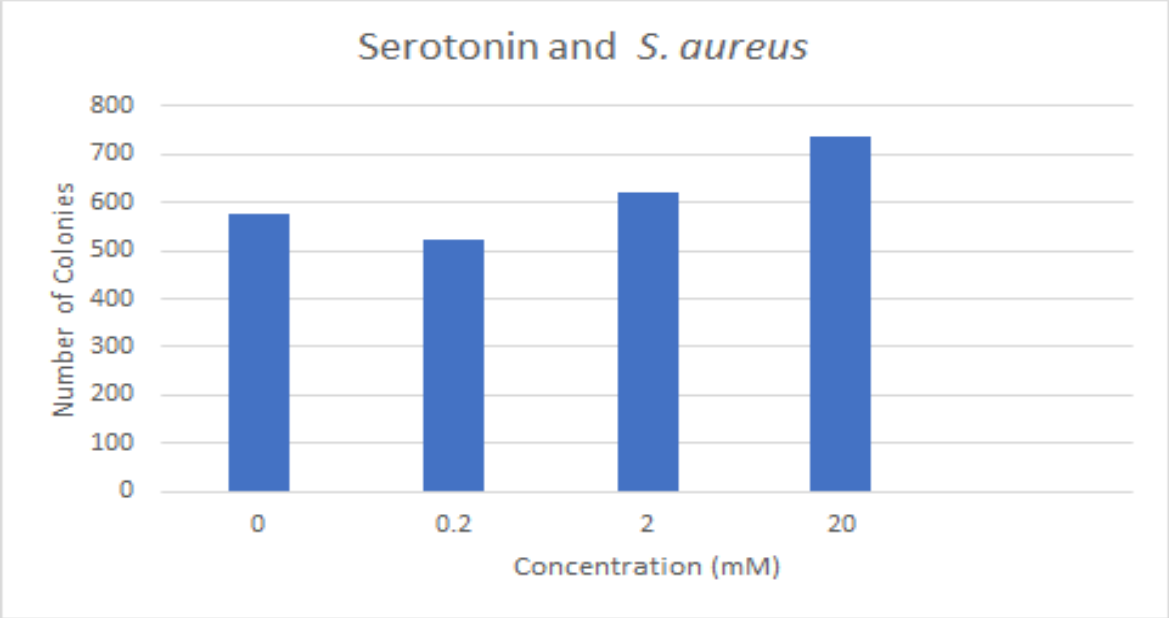

Figure 7: Serotonin and *S. aureus*

The graph in figure 7 displays a similar pattern to that in figure 8. No concentration of serotonin yielded 577 colonies. With a concentration of 0.2 mM, colony count falls below the control (516). With the higher concentrations of 2 & 20 mM, colony count exceeded that of the control (612 and 725) and showed a positive correlation in trend.

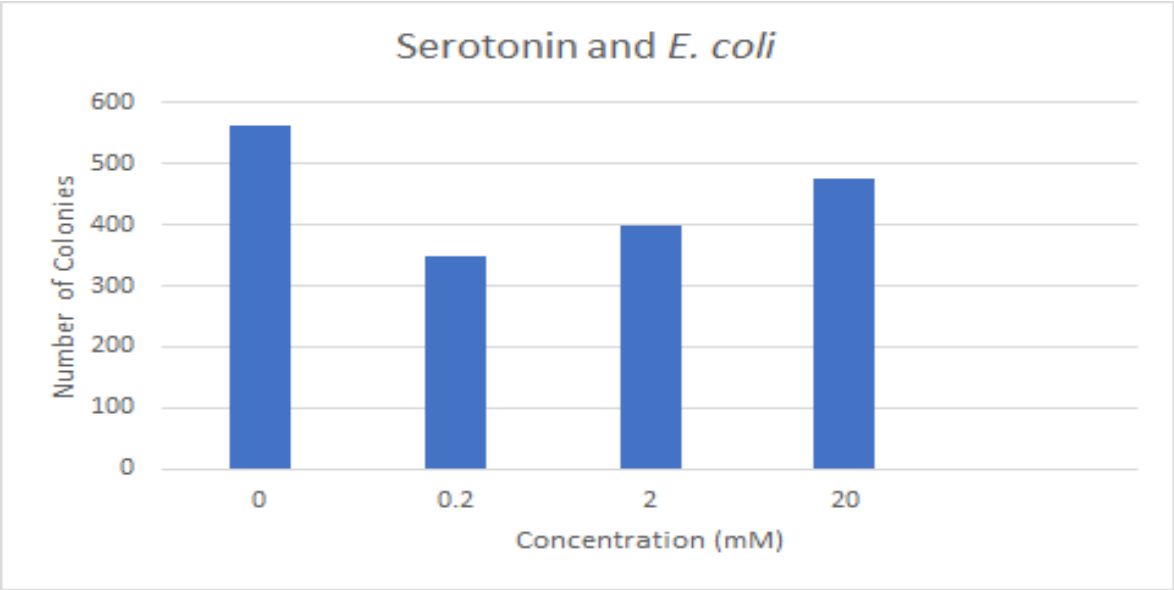

Figure 8: Serotonin and *E. coli*

Per the results displayed in figure 8, serotonin in lower concentrations results in decreased colony count. As the concentration increased, colony confluence also increased. No concentration of serotonin resulted in 626 colonies, .2 mM resulted in 389 colonies, 2 mM resulted in 396 colonies, and 20 mM resulted in 473 colonies. More tests are needed to determine if continued increase of serotonin levels would result in colony counts above that of the control.

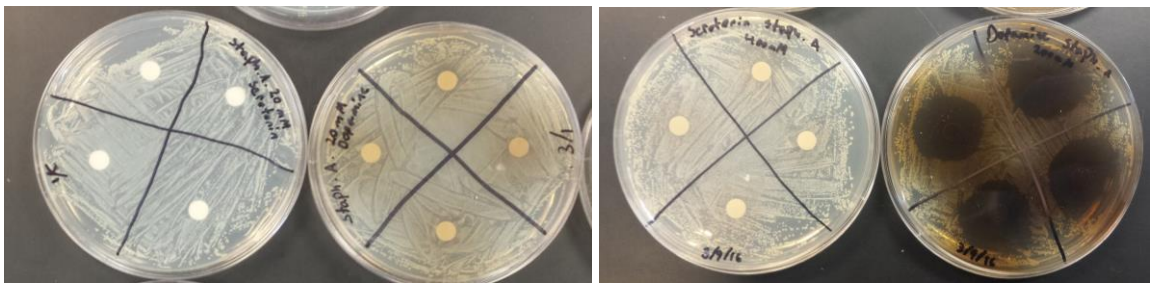

Figure 9: Growth inhibition plate

The photos in figure 9 depict an example of the growth inhibition testing using absorption disks. The concentrations of serotonin with *S. aureus* on the left yielded no bacterial growth inhibition, but displayed slight oxidative discoloration. The culture on the right displays a higher concentration of dopamine and *S. aureus*, and subsequently presented inhibition and darker oxidative discoloration.

Conclusion:

The final conclusion of the tests with dopaminergic and monoamine neurotransmitters on gram negative and gram positive bacteria show that dopamine inhibits growth in both *E. coli.* and *S. aureus*, but serotonin has the potential to incite growth in *S. aureus* and potentially *E. coli.*.

Figures 3 & 4 depict no inhibition of growth when the two bacterial species were treated with the neurotransmitter serotonin, up until the 200 mM mark for *S. aureus*. This, in conjunction with the finding of increased colony count when *S. aureus* was treated with serotonin (figure 7), may be indicative of a type of biological Le Chatelier's principle. As serotonin is applied to the biological system, it may be metabolized and aid in bacterial proliferation.

The findings suggest that a connection between the mental illnesses associated with serotonin and dopamine may be influenced by or influencing the nature of bacterial infection. Neurotransmitters serve as a messaging and control system between the biological and psychological realms of human life. When stress, psychosis, or mood fluctuations are occurring, it is possible that this sparks "[an increased] risk of developing an infection due to stress hormone reductions in immune function," ultimately increasing the presence of pathogenic microbes (Primrose 2013).

Further research is needed to understand the expansive microbiome and its relation to the human mind and perceptions of consciousness. Continuous extensions of this research project need to be done in order to further attest the direct relationship between neurotransmitter induction on bacterial gene expression and perpetuation.

References:

1. **Freestone, P**. 2013. "Communication between Bacteria and Their Hosts," Scientifica, vol. 2013, Article ID 361073, 15 pages, 2013. doi:10.1155/2013/361073
2. **Graham, K.L.** 2014. "Urinary Tract Infections in Acute Psychosis" Department of Psychiatry and Health Behavior, George Reagents Univ., Journal of Clinical Psychiatry. Web.
3. **Messaoudi, M., Lalonde, R., Violle, N.** 2011. Assessment of psychotropic-like properties of a probiotic formulation (*Lactobacillus helveticus* R0052 and *Bifidobacterium longum* R0175) in rats and human subjects. 2011. Br J Nutr 2011;105:755–764

Acknowledgments:

Special thanks is owed to Dr. Anat Lev, Hisayo Tokura-Gallo, the SPARC3 Scholars program, and the Gaston College Arts and Sciences division.

Pine Trees are Dominant on Residential Properties in Dix Hills but not in Farmingdale, NY

Authors: Mya Nicole Brown and Megan Banks

Keywords: Long Island, Nassau County, Suffolk County, Pine Trees

Contact: Louis Roccanova, Natural Sciences Department, Suffolk County Community College, Brentwood, N.Y. 11717

Abstract:

Tree samples were collected from residential properties in Nassau County and Suffolk County in Long Island in order to be compared to one another. Once the samples were collected, two dichotomous keys and an iPhone app were used to verify the different species. The following species were found in Nassau County, Farmingdale: An Eastern Red Cedar (*Juniperus virginiana*) and A Silver Maple (*Acer saccharinum.*) In Suffolk County, Dix Hills, the following mixture of species were found: Eastern White Pines (*Pinus strobus*), Shortleaf Pines (*Pinus echinata*) and Eastern Black Oaks (*Quercus velutina.*) A total of forty specimens were taken from both Nassau County and Suffolk County combined. In this investigation it was confirmed that residences in Suffolk County were home to more pine trees than in Nassau County.

Introduction:

Taxonomy is the study of living organisms. A "two name" system referred to as binomial nomenclature was developed by Carolus Linnaes (Purves et al. 2001). The system of nomenclature in which two terms are used to denote a species of living organism, the first one indicating the genus and the second the species. Linnaues developed the sequence ranging from largest to smallest. Kingdom, phylum, class, order, family, genus and species. This system not only helps us understand the names of these species, but also their evolution and where they originated.

Throughout New York, there are approximately 20 Million acres of trees, which cover 62% of New York State (Leopold 2003). Due to the regions having such dramatic climate changes, a wide variety of different species is deemed to be much more unique. It is very important to researchers to know what types of trees are native to their environment. In order to identify the different tree species, two dichotomous keys were used. Dichotomous keys were developed to help scientists identify organisms in the natural world, such as trees, wildflowers, mammals, reptiles, rocks, and fish. They are divided into two parts, the key gives us a series of choices and questions that eventually lead us to the right answer. Also, in modern technology, it allows us to take pictures of the tree species and identify them through an iPhone application.

The samples collected for this experiment came from Long Island, New York. The towns include Farmingdale and Dix Hills which both had a variety of similar and different tree species. Many tree species differ due to the locations and climate, so some of the trees found in Farmingdale and Dix Hills were not all the same due to land around them. Farmingdale is very flat with its elevation being at 2103.12 centimeters, versus Dix Hills being a rather hilly area with its elevation at 6187.44 centimeters.

Method:

Samples of trees were taken from both Nassau County and Suffolk County residential locations in Long Island. The samples taken from Nassau County came from the town of Farmingdale and the

samples taken from Suffolk County came from the town of Dix Hills. To help us with this experiment, multiple dichotomous keys were used to determine the species of the trees collected from the two different properties in the two different towns. The first tree findings were found by using "Tree Finder" (Watts, 1991). Then we used another dichotomous key to cross identify our earlier findings (Petrides, 1998). We studied the characteristics of our trees and eliminated choices one by one by looking at certain shapes, sizes, colors, leaves and needles. Longitude and latitude of the residential properties were found by using "My Nasa Data" (2016). Elevation of the properties were found using "Elevation Map" (2017).

Results:

As seen in table one and table two, the following species were found at the Farmingdale location: two Eastern Red Cedars (*Juniperus virginiana*) and two Silver Maples (*Acer saccharinum*). The following species were found at the Dix Hills location: thirteen Eastern White Pines (*Pinus strobus*), fifteen Shortleaf Pines (*Pinus echinata*) and eight Eastern Black Oaks (*Quercus velutina*). Resulting in a total of forty trees identified by species.

Table 1: Nassau County Tree Species

Amount Identified	Percent	Common Name	Species
Two	5%	Eastern Red Cedar	*Juniperus virginiana*
Two	5%	Silver Maple	*Acer saccharinum*

Table 2: Suffolk County Tree Species

Amount Identified	Percent	Common Name	Species
Thirteen	30%	Eastern White Pine	*Pinus strobus*
Fifteen	38%	Shortleaf Pine	*Pinus echinata*
Eight	20%	Eastern Black Oak	*Quercus velutina*

Table 3: Tree Circumferences

Tree Name and Species	Average Circumference
Eastern Red Cedar (*Juniperus virginiana*)	40.64 cm
Silver Maple (*Acer saccharinum*)	83.82 cm
Eastern White Pine (*Pinus strobus*)	50.80 cm
Shortleaf Pine (*Pinus strobus*)	116.84 cm
Eastern Black Oak (*Quercus velutina*)	124.46 cm

Table 4: Property Specimen Locations

	Nassau County	Suffolk County
Longitude and Latitude	40.725975, -73.448223	40.775018, -73.356217
Town	Farmingdale	Dix Hills
Elevation	2103.12 cm	6187.44 cm

Cedars that they collected in their Nassau County experiment were also found in Farmingdale in this study. Townes et al. (2012) found samples of a Silver Maples in Central Islip, and we found the same tree species in Farmingdale. Some trees are more common than others at specific locations. For example, pine trees such as the Eastern White Pine and Shortleaf Pine that we found in Dix Hills are native eastern Northern American coniferous trees which are very common on the north side of Long Island according to Long Island Native Nursery (Gettinger, 2007). From the samples gathered from our properties, we noticed that Red Cedars were more common in Nassau County and variations of Pine trees were more common in Suffolk County.

Conclusion:

Four trees from Nassau County and thirty-six trees from Suffolk County were identified and verified using two dichotomous keys. Based on our results, the most common tree throughout Long Island are Pines including Eastern White Pines (*Pinus strobus*) and Shortleaf Pines (*Pinus strobus*).

References:

1. **Leopold, D.J., & Brown H.P.** 2003 Trees of New York State: Native and Naturalized. 1st ed. Syracuse, NY: Syracuse UP
2. **Watts, T. M.** 1991 Tree Finder: A Manual for the Identification of Trees by Their Leaves. Rochester, NY: Nature Study Guild
3. **Petrides, G. A., & Wehr J.** 1998 A Field Guide to Eastern Trees: Eastern United States and Canada, including the Midwest. Boston: Houghton Mifflin
4. **Purves, William k., Sadava, David, Gorden Orians H., Heller, H. Craig** 2001 Life: The Science of Biology, Sixth Edition, Sinauer Associates, Inc.
5. **Altenburg K., Hempel K.** 2012 Comparing Tree Species from Northern and Central Long Island, SATURN J., Vol. 2, No. 2, p.6-9.
6. **Chambers, L.** 2017 "Longitude/Latitude Finder - MY NASA DATA." *NASA.* NASA, 9 Sept. 2016. Web. 30 Apr. 2017.
7. **ElevationMap.net.** 2017 "Elevation Maps with Altitude Finder for Any Location. Altimeter Tool. *"With Altitude Finder for Any Location. Altimeter Tool.* Worldwide Elevation, 2017. Web. 08 May 2017.

Maple Trees are Prevalent in Northport/ East Northport Long Island When Comparing Samples Found from a Residential Property and a Local Nature Preserve

Author: Chloe Cardinale

Contact: Louis Roccanova, Natural Sciences Department, Suffolk County Community College, Brentwood, N.Y. 11717

Keywords: Northport, Makamah, Maple, Trees

Abstract:

Tree samples were taken from a residential property and Makamah Nature Preserve in Northport, Long Island. By using dichotomous keys, we were able to classify all of the samples and identify the species of trees from both locations. A total of 42 samples were collected. The student discovered that there were 4 trees that both places had in common. It was also discovered that 21% of all the tree samples are Maple (*Acer*) trees.

Introduction:

The Northport/ East Northport area is approximately 19.901 square kilometers (Google Maps 2017). Within that area are the residential properties and nature preserve. The average amount of precipitation in Northport, Long Island was approximately 9.144 centimeters in 2016. The average temperature was approximately 11.83 degrees Celsius in 2016 (Areavibes 2016). Northport is approximately 32 meters above sea level (Sperling's Best Places 2017). Since the overall climate of both locations was the same, it gave the trees extremely similar environments to grow and develop.

Method:

A student took tree samples from her residential property and Makamah Nature Preserve in Northport Long Island. 18 samples were taken from the residential property and 24 samples were taken from a 9.75 square meter area from Makamah Nature Preserve. All together the student collected 42 tree samples. The two locations are approximately are 5.8 square kilometers apart from each other. Being so close to one another and also being within the same town, many factors are the same which allow the same tree species to grow, including precipitation and temperature. The student was able to identify the tree samples by using dichotomous keys (Watts 1991) (University of Wisconsin at Stevens Point 2014) and an application on the smartphone called leafsnap (Belhumeur 2016).

Results:

There were 18 tree samples taken from the residential property (40.8754, -73.3273). The trees found include White Pine (*Pinus strobus),* American Holly (*Ilex opaca*), 7 Atlantic White Cedar (*Chamaecyparis thyoides*), Japanese Maple (*Acer palmatum*), 2 Red Spruce (*Picea rubens*), Green Ash (*Fraxinus pennsylvanica*), Balsam Fir (*Abies balsamea*), Colorado Spruce (*Picea pungens*), 2 Flowering Dogwood (*Cornus florida*) and a Red Maple (*Acer rubrum*). The most popular tree found at the property was Atlantic White Cedar (*Chamaecyparis thyoides*), which was 39% of the trees on the property.

There were 24 tree samples taken from a 9.75 square meter area in Makamah Nature Preserve (40.9158, -73.3163). The trees found include American Holly (*Ilex opaca*), 4 Sugar Maples (*Acer saccharum)*, White Ash (*Fraxinus americana*), Beech (*Fagus grandifolia)*, 3 Red Maples (*Acer rubrum*), 2 Red Spruce (*Picea rubens*), Slippery Elm (*Ulmus rubra*), 2 Eastern White Pine (*Pinus strobus*), 2 White Oak (*Quercus alba*), Black Cherry (*Prunus serotina*), 2 Bur Oak (*Quercus macrocarpa*), Green Ash (*Fraxinus pennsylvanica),* American Basswood (*Tilia americana*), Tamarack (*Larix laricina*) and a

Shagbark Hickory (*Carya ovata*). The most popular tree found in the 9.75 square meter area at Makamah Nature Preserve was the Sugar Maple (*Acer saccharum),* which makes up about 16% of the tree samples taken from the preserve.

American Holly (*Ilex opaca),*Green Ash (*Fraxinus pennsylvanica)*, Red Spruce (*Picea rubens)* and Red Maple (*Acer rubrum)* were found on both the preserve and residential property. Out of the 42 tree samples, the genus that was most abundant was Maple (Acer), there was 9 different Maple trees, which makes up 21% of the all samples identified.

Table 2:Trees found from Northport Residence (40.8754, -73.3273)

Name of Tree	**Scientific Name**	**Number of tree of Property**	**Percentage found on property**
White Pine	*Pinus strobus*	1	5.6%
American Holly	*Ilex opaca*	1	5.6%
Atlantic White Cedar	*Chamecyparis thyoides*	7	39.0%
Japanese Maple	*Acer palmatum*	1	5.6%
Red Spruce	*Picea rubens*	2	11.1%
Balsam Fir	*Abies balsamea*	1	5.6%
Green Ash	*Fraxinus pennsylvanica*	1	5.6%
Colorado Spruce	*Picea rubens*	1	5.6%
Flowering Dogwood	*Cornus florida*	2	11.1%
Red Maple	*Acer rubrum*	1	5.6%

Table 1:Trees found from Makamah Nature Preserve (40.9158, -73.3163)

Name of Tree	***Scientific Name***	**Number of tree of Property**	**Percentage found of property**
American Holly	*Ilex opaca*	1	4.2%
Sugar Maple	*Acer saccharum*	4	16.7%
White Ash	*Fraxinus americana*	1	4.2%
Beech	*Fagus grandifolia*	1	4.2%
Red Maple	*Acer rubrum*	3	12.5%
Red Spruce	*Picea rubens*	2	8.3%
Slippery Elm	*Ulmus rubra*	1	4.2%
Eastern White Pine	*Pinus strobus*	2	8.3%
White Oak	*Quercus alba*	2	8.3%
Black Cherry	*Prunus serotina*	1	4.2%
Bur Oak	*Quercus macrocarpa*	2	8.3%
Green Ash	*Fraxinus americana*	1	4.2%
American Basswood	*Tilia americana*	1	4.2%
Tamarack	*Larix larcina*	1	4.2%
Shagbark Hickory	*Carya outata*	1	4.2%

Discussion:

Even though there is only 5.8 kilometers between the residential property and Makamah Nature Preserve (Google Maps 2016), they share very few of the same trees. Some of the most popular trees found on Long Island are Maple trees. The most common Maple tree native to Long Island is the Red Maple (Morgan 2005), and Sugar Maples are also abundant and native to Long Island. Maples are extremely winter hardy trees, that is why they are abundant in northern regions (Sternberg & Wilson 2004). Although there were Maples (*Acer*) on both of the properties; only 1 Maple was the same species on both of the properties. Both properties shared Red Maple. Castro et al (2016) also reported that the most popular genus was *Acer*. 12 samples out of 41 total samples from Commack, Lindenhurst and Bayshore were *Acer* and one sample of *Acer* was found on each property. These results indicate that *Acer* is common on Long Island.

The trees found on the residential property were more closely related to one another, 39% of the trees found were Atlantic White Cedar (*Chamaecyparis thyoides)* and 66.9% of the trees found were conifers. Whereas the trees found at Makamah Nature Preserve showed that the tree samples were much more diverse within the 9.75 square meter area than the residential property. There were many different species, and the species varied more than they were similar.

Conclusion:

Since comparing the two properties, it was found that although only being 5.8 kilometers apart from each other, the makeup of the landscapes varied tremendously. Some species were shared amongst the two properties, American Holly (*Ilex opaca),* Green Ash (*Fraxinus americana),* Red Spruce (*Picea rubens)* and Red Maple (*Acer rubrum),* but these species only account for 28.6% of the total amount of samples taken. The remainder of the samples (71.4% of the trees) are different. Furthermore, it can be concluded that although the distance is so close, the makeup of the landscape is more different than similar, resulting in a large diversity of species.

References:

1.**Areavibes.** 2017. "Northport, NY Weather." *AreaVibes - The Best Places To Live*. N.p., n.d. Web..
2.**Belhumeurand P., Jacobs D.** 2016. Leafsnap, Columbia University, University of Maryland, Smithsonian Institution. http://leafsnap.com/
3. **Bert Sperling.** 2016. "Northport, New York Climate." *Sperling's Bestplaces*. N.p., Dec. 2016. Web.
4. **Castro J., DePasquale D., Hinsch B., Morales S,.** 2017. Non-native Trees and Maples are Prevalent in the towns of Commack, Bay Shore and Lindenhurst., *SATURN J.,* 5(1) 10-14
5**.Google Maps**. 2017. "Google Maps." *Google Maps*. Web.
6. **MapQuest.** 2014. Latitude and Longitude Finder, Map Get Coordinates. MapQuest.com.
.7.**Moran, Edward.** 2005. "Environment: Long Island Trees." *Long Island Trees - Know Your Maples*. North Shore WX, 14 Aug. Web.
8. **Sternberg G, Wilson J**. 2004. Native Trees for North American Landscapes. Portland: Timber Press. Print.
9**.University of Wisconsin, Stevens Point.** 2014."Glossary for Tree Improvement Workers." *Journal of Heredity* 63.5 (1972): 263. *LEAF Winter Tree ID Key*. Web.
10**.Watts, May Theilgaard.** 1991. Tree Finder: A Manual for the Identification of Trees by Their Leaves, Rochester, NY: Nature Study Guide Publishers. Print.

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The Effect of Carboplatin, a Chemotherapeutic Agent, on Tadpole and Planarian Regeneration

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Keywords: Carboplatin, Tadpoles, Planaria, Regeneration

Abstract: Both planaria and tadpoles have been used as model organisms for the study of regeneration. The planarian has a capability of regenerating a parts of its body which have been removed, as well as regenerating if cut in half. The tadpole has less of an ability to regenerate and can only regenerate its limb buds, eyes, and up to 75% of its tail. Teratogens are agents such as chemicals, viruses and radiation, can affect development and regeneration. We tested the effect of a chemotherapy drug, carboplatin, on regeneration on both planarian and tadpoles. We amputated 50% of the planarian and 50% of the tadpole tail and incubated them in spring water and carboplatin, and tracked rate of re-growth over 11 days and 7 days for the planarian and tadpole respectively. Our results show that carboplatin enhanced rate of regeneration which was contrary to our hypothesis. The results of this study suggest that further research should be done on how carboplatin affects rapidly dividing cells during development.

Introduction:

Currently, research is being conducted for remedies that will transcend the capabilities of human's rehabilitative process when harm occurs in organs and tissues either by physical injury or disease. Two organisms that routinely studied are planarian and frog tadpoles for their regenerative abilities (Beck et al. 2009; Tyler et al. 2010).

Planarians are unrestricted flatworms that belong to the class, Turbellarians and the phylum Platyhelminthes. Like humans, they have three germ layers: ectoderm, mesoderm, and endoderm but no body cavity. Planarians display bilateral symmetry and have three elementary organ systems, which include a nervous system that is composed of a limited brain two long nerve cords that run laterally from head to tail and transverse nerve cords, the whole nervous system structure resembles a ladder. The digestive system consists of a mouth (located on the underside of the body covered in cilia), pharynx and a gastrovascular cavity-where digestion occurs. And lastly, the reproductive system which is constructed to perform both sexual and asexual reproduction. Interestingly, sexual reproduction will occur when planarians deliver eggs or sperm through excretion. The fertilized egg will mature inside the planarian then released as capsules, approximately after 14 days the eggs will hatch and develop into adult planarian. During asexual reproduction, a planarian will forcibly disconnect its tail and then eventually regenerate its missing parts, thus becoming two Planarians.

Planarian can regenerate due to its pluripotent stem cells (cells that develop into any type of cell or tissue), they are the only cells that can multiply in the Planarian. Planarian cells that are detached or physically cut will multiply to form a blastema that would differentiate into new cells to regenerate the absent parts of the Planarian.

Planarians can be found in both freshwater and marine environments as well as terrestrial niches. Planarians are able to move around by using the cilia on their ventral exterior to drift over surfaces. Planarians have a variety of pigments ranging from variations of brown, black, and white. A typical planarian has a triangular head, two ear-like structures, which contain chemoreceptors to help locate food; and two ocelli (eye type structures) that is used to identify light, which they try avoid as

much as possible. Planarians are both predators and scavengers; through the use of their protruding pharynx and enzymes it is able to digest food. The mouth is used for both ingestion and digestion, however, unlike human, digestion is completed in cells. Like Planarians, frog tadpoles have an exceptional regenerative capability. After amputation, a tadpole's tail can regenerate within a week's time. Recent studies imply that the regenerative process is said to be due to free radicals. (Tyler et al. 2009).

The word tadpole literally means toad head which describes exactly what they are-"wiggling heads". As tadpoles, they bear no resemblance to their parent frogs or toads, due to most noticeably not having any appendages. The general anatomy of tadpole can vary depending on the specie of frogs, but in general a tadpole starting with its head known as the body-has eyes, a spiracle (fin like structure on side of head), nostrils and a mouth or oral disc that surprisingly has teeth. On the tail there is a dorsal and ventral fin separated by the tail musculature and vent located between the ventral fin and head.

The tadpole is the first stage of a Frog's/amphibians life cycle; before a tadpole is free known as its hatching period (two weeks to 21 days) it must eat its way out of the jelly covering of its egg enclosure. A hatched tadpole with an average size of 3 centimeters to 25 centimeters (depending on type) will try to remain camouflaged from prey, while feeding on plants and algae. Eventually it will develop appendages and lose its tail and start to resemble their parent frog or toad. The whole metamorphic process from tadpole to mature frog can take up to an average seven weeks or longer, but it depends on the quality of food and the environment (Beck et al. 2009)

A teratogen is defined as an agent that has the ability to cause a malformation in an embryo. These factors have the ability to disrupt development and cause congenital malformations and/or birth defects. Teratogens are able to diffuse and pass through the placenta from the mother to the fetus. Teratogens can affect an embryo throughout all stages of development and depending on the agent, the amount of harm can increase or decrease as gestational age increases. These defects are present from birth and sometimes are unable to be detected. There are three major divisions of teratogens depending on the source; genetic, environmental, or multifactorial. Genetic etiologies of malformations include chromosomal abnormalities dealing with structure of the chromosomes as well as the number of chromosomes, one example being Down Syndrome or Trisomy 21. Environmental causes include intrauterine infections, maternal metabolic disorders, environmental chemicals, drugs/medications, and ionizing radiation. These are all outside influences on the embryo and its environment causing an abnormality in its structure and function. Lastly, multifactorial agents are those formed from many different factors, possibly of the environmental and chromosomal type, or have an unknown origin (Chung 2004).

A teratogen is an agent that may cause a birth defect when introduced at the stage of the embryo. This is not only something that affects humans but is also harmful in other organisms. Carboplatin is a chemotherapy medication used to treat different forms of cancer. Carboplatin works by stopping cancer cells from multiplying, it does this by binding together the strands of the cells' DNA (Lum et al. 2013). For this experiment, we will examine how the regenerative process is affected for both planaria and tadpoles when exposed to chemotherapy drug carboplatin, and environmental teratogen. Our hypothesis was that the regenerative process of both planarian and tadpole will be halted if exposed to the chemical carboplatin.

Materials and Methods:

Planaria regeneration set up:

To start the lab, 12 planaria were selected out of a sample to be separated into the wells of a 6-well plate. The full length of each planarian was measured. Then we cut the planarian in half with a scalpel, being as precise as possible. It is important to make sure the planaria are completely elongated and

stretched out before cutting to ensure that the planarian are being cut in half as close to exact as possible. The cephalic portion of the planarian were placed in one of the wells while the caudal portion was discarded. The measurement of length after the cut was then taken and recorded. This was done to all 12 planaria selected. The planarian did not need food because they are supposed to be deprived of food as they are regenerating. The planarian plates were kept in a dark box where no light could get through.

Tadpole regeneration set up:

Next, 12 tadpoles were selected. The full length of each tadpole was measured and recorded. Instead of cutting the tadpoles completely in half, making them non-viable, the tails were cut in half using the scalpel, or as close to 45% as possible. The tadpoles were very active, therefore they were put in ice water to slow movement for a more precise cut. Once the tails were cut, each tadpole was separated into a well. The length after the cut was then measured and recorded. Clean, room temperature distilled water was placed in each well of both the planarian and the tadpoles. 3 mL of water was in each tadpole well while 2 mL of water was in each planarian well. One six well plate of planarian and one six well plate of tadpoles were selected as control groups. These plates were not given any teratogen. For the tadpoles, this meant that the water was changed and they were fed on weekdays. They were kept in a warmer area of the room by a light source.

Administering carboplatin:

In the experimental plates carboplatin, a commonly used chemotherapy drug, was administered to each well of both experimental 6-well plates. In the tadpole experimental group, 3 µL of 100ug/ml were administered to each well on Day 0 while in planarian experimental wells, 2 µL were administered. On day 3 they were administered another dose with the daily maintenance. Each day for 11 days the planarian were measured and logged along with the tadpoles. This data was then used to calculate percent growth comparing the original length to the length on Day 0 after they were cut.

Results:

The growth rate of the planarians were computed as percentage of original growth per day. **(**Table 1**)** The data collected for the each group on each day were then averaged prior to graphing. **(**Figure 1**)** The same data was collected for the tadpoles. **(**Table 2**),** and graphed as a scatter plot. It was found that the regeneration rate was higher for the organisms treated with carboplatin for both the planarians and the tadpoles. **(**Table 3**)**

Planarian	Control	Experimental
Days after cut	Mean percent of original length	Mean percent of original length
0	52.62237762	38.58260161
3	60.86829837	59.22844699
4	58.21289821	61.60858148
6	57.33877234	58.47669874
7	60.5963481	62.22767729
10	67.38636364	61.32067932
11	68.78496503	68.71578422

Table 1. The data that was collected and used to form a scatter plot (Figure 1).

Figure 1. The data in figure one was graphed in a scatterplot, and a linear trendline was formed for each of the two groups

Tadpoles	control	experimental
Days after cut	Mean percent of original length	Mean percent of original length
0	60.88396897	62.61065324
3	64.65381024	92.62271062
4	67.70810888	73.97802198
5	76.5846082	92.62271062
7	85.41666667	105.7142857

Table 2. The mean lengths of the tadpoles and the days at which the respective measurements were taken.

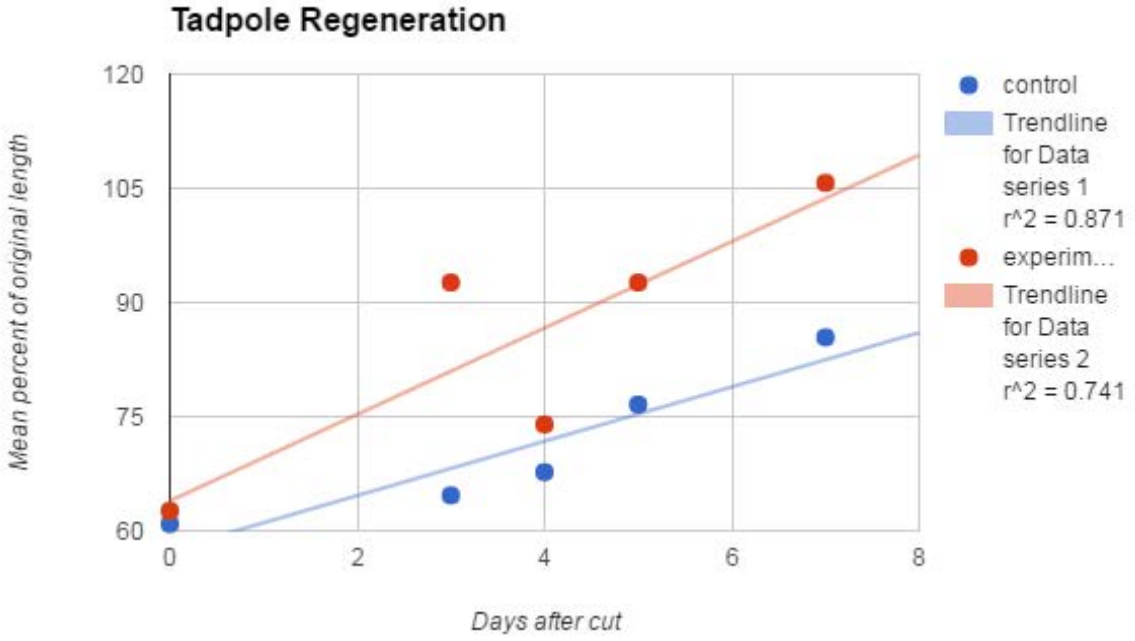

Figure 2. The mean of the length of the tadpoles (measured as percentage of their length prior to being cut), was averaged at each day, and graphed against the day at which the measurement was taken.

Tadpoles	Control	Experimental (+carbo)
Trendline equation	y = 3.57x + 60.88	y = 5.68x + 63.93
R squared	0.8706	0.7409
Mean Regeneration rate (% of original length/day)	3.57	5.68
Planarians	Control	Experimental (+carbo)
Trendline equation	y = 1.32x +53.09	y = 1.95x + 47.17
R squared	0.824	0.649
Mean Regeneration rate (% of original length/day)	1.32	1.95

Table 3. A summary of the data from both organisms.

Discussion:

Contrary to the prediction of the hypothesis the planarian and the tadpoles with the chemotherapy treatment had a faster regrowth rate than the control group. This was concluded after studying the data and calculating the regeneration rate. The regeneration rate stands for the percentage of the organism's actual length that grew back. The mean regeneration rate for the control group was 3.57 for Tadpoles and 1.32 for the planarian. The experimental group regeneration rate was 5.68 for the tadpoles and for the planarians it was 1.95. All this data was collected daily for a 3-week period, when the organisms had grown back to their previous lengths or even exceeded that length. The planarian

was able to grow better and survive through the experiment whereas 3 tadpoles did die. One of the tadpoles died from the experimental group and 2 died from the control group. This may have been prevented if their water had been changed more often and they had a larger body of water in which to swim.

Conclusion:

By introducing carboplatin to the planarian and the tadpoles during their early stages of development, this acted as a teratogen. Although we predicted that the experimental organisms would have the least amount of growth the opposite came true. Instead of killing cells, the organisms had abnormal growths of cells. To do further research in the topic of chemotherapy as a teratogen we can look at look how chemotherapy affects the organisms in their later stages of life. One can follow these tadpoles and planarian after the developmental stages and see how they growth see if there is any further abnormalities.

References:

1. **Beck, C., Belmonte, J., Christen, B.** 2009. Beyond Early Development: Xenopus as an Emerging Model for the Study of Regenerative Mechanisms. Developmental Dynamics. 238: 1226-1248.
2. **Chung, W**. 2004. Teratogens and Their Effects. Columbia University. Ch. 23, p. 1-8. http://www.columbia.edu/itc/hs/medical/humandev/2004/Chpt23-Teratogens.pdf
3. **Lum, E., Vigliotti, M., Banerjee, N., Cutter, N., Wrzeszczynski, K. O., Khan, S., Kamalakaran, S., Levine, D. A., Dimitrova, N., Lucito, R.** 2013. Loss of DOK2 induces carboplatin resistance in ovarian cancer via suppression of apoptosis. Gynecol Oncol. Aug;130 (2) :369-76. doi: 10.1016/j.ygyno.2013.05.002. Epub 2013 May 14. PubMed PMID: 23684582.
4. **Tyler, M**. 2010. Developmental Biology: A Guide for Experimental Biology. 3rd Edition. Sunderland (MA): Sinauer Associates. Chapter 13.

Austrian Pine and Arbor Vitae are Dominant Species on Residential Properties in Western Suffolk County, New York

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Key words: Austrian Pine, Arbor Vitae, Dominant, Suffolk

Abstract:

Tree species were compared on four residential properties. The species were similar on all four residential properties. The four locations we compared were in Farmingdale, Kings Park, Deer Park, and Smithtown located in western Suffolk County, NY. All four residential properties contained a shrub commonly known as Arbor Vitae (*Thuja occidentalis).* Three of the four contained Austrian Pine (*Pinus nigra)*. Other species were identified as Norway Maple trees (*Acer platanoides),* Sassafras (*Sassafras albidum)*, Star Magnolia (*Magnolia stellata)*, the Black Walnut (*Juglans nigra),* and finally a White Oak tree (*Quercus alba).* We identified and confirmed our species of trees using an application called "Leaf Snap" (Columbia University, University of Maryland, and Smithsonian Institution 2011) and a dichotomous key "VTree" (Seiler & Peterson 2012). Austrian Pine and Arbor Vitae were found to be the Dominant Species.

Introduction:

There are eighty-eight different species of trees on Long Island (Kosar & Brown 2016). The majority of the trees on our residential properties were planted as opposed to being naturally grown. Arbor Vitae are commonly used as barrier trees for privacy. They fit this role perfectly because they can grow fifteen to twenty three meters tall, and six to nine meters wide (Ettinger, 2017). This can also vary due to the climate in which we live, as well as whether the trees are planted or naturally grown. The environment on Long Island varies with the seasons. These seasons range from an average high temperature of 6.1 degrees Celsius to a low of 0 degrees Celsius in December, to a high of 28.8 degrees Celsius to a low of 20.5 degrees Celsius in July (The Weather Channel 2016). Throughout the winter of 2016 and 2017 Long Island has collected a total snowfall of 106.9 centimeters (Newsday 2016). In this study, tree species were compared on four residential properties in Farmingdale, Kings Park, Deer Park, and Smithtown located in western Suffolk County, NY.

Methods:

A total of forty-one trees were collected from four residential properties in Farmingdale, Deer Park, Kings Park, and Smithtown, located in western Suffolk County, NY. As a group effort, based on the amount of trees collected from each property, we considered combining two very similar properties located in Deer Park. The reasoning behind this combination was because one location in Deer Park had an insufficient amount of trees, while another had an overwhelming amount of trees identified. The areas are very similar in location and only vary by a few latitude and longitude coordinates. In Kings Park we collected nine trees, and in Deer Park we took samples from seventeen trees. In Farmingdale eight tree samples were collected, and in Smithtown seven trees were obtained. We collected, identified, and confirmed the trees species found on each property using the applications on our mobile devices known as "Leaf Snap" (Columbia University, University of Maryland, and Smithsonian Institution 2011) and "VTree" (Seiler & Peterson 2012). Having access to these applications on mobile device provides the ability to identify specific tree species based on leaf and branch samples. By using

such applications we were able to compare each location and tree species. We found each residential property's latitude and longitude by using "Latitude/ Longitude Finder- MY NASA DATA." (Oostra 2016).

Results:

The longitude and latitude of the property in Farmingdale were 40.713075,- 73.441192. The longitude and latitude of the property in Deer Park located at Wright Ave were 40.772508,-73.323435. The longitude and latitude of the trees in Kings Park were located at Seventh Ave. with coordinates of 40.879296,-73266643. The longitude and latitude of the trees in Smithtown were located at Adra Court with the coordinates of 50.827720,-73.238325.

Table 1 shows the results of the trees found in Farmingdale. There are 5 Austrian Pines *(Pinus nigra)* and 3 Arbor Vitae *(Thuja-occidentais).* Table 2 shows the trees found in Deer Park, which are 4 Norway Maples *(Acer platanoides),* 2 White Oaks *(Quercus alba),* 1 Star Magnolia *(Magnolia stellata),* 4 Arbor Vitae (*Thuja-occidentais),* 4 Austrian Pines *(Pinus nigra),* 1 Sassafrass *(Sassafrass albiclum),* and finally 1 Black Walnut *(Juglans nigra).* Table 3 shows the trees found in Kings Park are 2 Austrian Pine *(Pinus nigra),* and 7 Arbor Vitae *(Thuja-occidentais).* Table 4 shows the trees found in Smithtown are 7 Arbor Vitae *(Thuja-occidentais).*

In Farmingdale, Deer Park, Kings Park, and Smithtown there are a total of 21 Arbor Vitae *(Thuja occidentias).* In Farmingdale, Deer Park, and Kings Park there are a total of 11 Austrian Pines *(Pinus nigra).* Fifty-one percent of the total trees in this study were Arbor Vitae and twenty-seven percent were Austrian Pine.

Table 1. Farmingdale Lat.40.713075 Long. -73.441192

Name of Tree	**Scientific Name**	**Quantity**	**%**
Austrian Pine	*Pinus nigra*	5	62.5%
Arbor Vitae	*Thuja occidentalis*	3	37.5%

Table 2. Deer Park Lat. 40.772508 Long. -73.323435

Name of Tree	**Scientific Name**	**Quantity**	**%**
Norway Maple	*Acer platanoides*	4	22.2%
White Oak	*Quercus alba*	2	11.1%
Star Magnolia	*Magnolia stellata*	1	5.5%
Arbor Vitae	*Thuja occidentalis*	4	22.2%
Austrian Pine	*Pinus nigra*	4	22.2%
Sassafras	*Sassafras albidum*	1	5.5%
Black Walnut	*Juglans nigra*	1	5.5%

Table 3. Kings Park Lat. 40.879296 Long. -73.266643

Name of Tree	**Scientific Name**	**Quantity**	**%**
Austrian Pine	*Pinus nigra*	2	22.2%
Arbor Vitae	*Thuja occidentalis*	7	77.7%

Table 4. Smithtown Lat. 40.827720 Long. -73.238325

Name of Tree	**Scientific Name**	**Quantity**	**%**
Arbor Vitae	*Thuja occidentalis*	7	100%

Discussion:

Polanco (2016) identified that a residential property in Farmingdale contained four Arbor Vitae (*Thuja occidentalis*) and four White Oak Trees (*Quercus alba*). Two residential properties in this study also contained these two tree species. According to a report by Campitiello et al. (2015) a residential property in Deer Park contained one Norway Maple (*Acer platanoides)* while our residential area contained four. The tree species found on the residential property in Deer Park were identified as non-native to the area. Norway Maple (*Acer platanoides*) originates from Europe not directly from the Western Suffolk County area (Columbia University, University of Maryland, and Smithsonian Institution 2011).

Conclusion:

21 out of the 41 trees and shrubs (51%), found on residential properties in the towns of Deer Park, Farmingdale, Smithtown, and Kings Park, were Arbor Vitae (*Thuja occidentalis*). Eleven out of the 41 trees studied in this experiment were Austrian Pine (*Pinus nigra*) making up 27%. The remaining species discovered amongst our properties were the White Oak (*Quercus alba*), the Star Magnolia (*Magnolia stellata*), the Sassafras (*Sassafras lauraceae*) and the Black Walnut (*Juglans nigra*). All of these remaining trees make up the other twenty-two percent of our findings.

References:

1. **Columbia University, University of Maryland, Smithsonian Institution** (2011). "Leaf Snap" Columbia University, University of Maryland, Smithsonian Institution.
2. **Seiler, J.R., Peterson, J.A.**, 2012. Virginia Technical Institute Tree Identification, Virginia Polytechnic Institute and State University
3. **Ettinger. T.** 2017. "Horticulture Consulting Services." Terry L. Ettinger Horticulture Consulting Services.
4.**Polanco. J**, 2016. "There are Greater Variety of Tree Species in Lindenhurst then Farmingdale, N.Y. *SATURN. J.* Vol.5.1, pp.39-43.
5. **Kosar. M, and Brown, P.** 2016." Red Maples Are a Dominant Species on the North Shore and South Shore of Long Island While Spruces and Vitaes Are Dominant on the North Shore and Oaks on the South Shore." *SATURN J.* Vol.5.1, pp.17-19.
6. **Oostra, D.** 2017. "Latitude/Longitude Finder - MY NASA DATA." National Aeronautics and Space Administration (NASA).
7. **Weather Department** (2016). "Long Island weather: Snowfall totals since 1947." Newsday.
8. **The Weather Channel** 2016. "Long Island City, NY (11101) Monthly Weather Forecast." The Weather Company LLC.
9. **Campitiello. J, Footman. K, Pabisch. E, Restrepo. A, and Zoly. K.** 2015. "Non-Native Tree Species Outnumber Native Tree Species found on Four Residential Properties in Deer Park, East Northport, Amityville, and Bay Shore in Long Island, New York." *SATURN J.* Vol. 4.1, pp. 6-10.

Age, Race, Gender and Their Relation to Support of the Islamic Travel & Immigration Ban in Suffolk County

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Keyworks: Statistics, Travel Ban, Islamic Countries, Suffolk County, Donald Trump

Abstract:

Shortly after his inauguration, President Donald Trump followed through on one of his many campaign promises by enacting a ban on travel and immigration from several predominantly Islamic countries. A study subsequently took place to investigate the connection of a number of factors and a population's opinion on the travel ban. Making use of Carl Pearson's Chi Square test of independence (utilizing both a 5% and 10% level of significance), while considering three main factors (age, race, and gender), we found that age had the most profound association for resident's preference on the travel ban in Suffolk County.

Introduction:

One of the most polarizing figures of our time, President Donald J. Trump recently introduced legislation on more than one occasion which restricts travel and immigration from predominantly Muslim countries. Studies find Americans are strongly divided on the subject. Our study takes a look at the influence that race, age, and gender have on the residents of Suffolk County and their support of the controversial executive order. The data analyzed in this study was collected from 223 Suffolk county residents.

Note:

We've made use of the shorthand names for "Caucasian," "African-American," and "Hispanic/Latino-American" by referring to them as "White," "Black," and "Hispanic" in our study.

Method:

Restricted to only residents of Suffolk County, residents of varying races, age, and genders were surveyed via both telephone calls as well as face to face interviews. They were asked what their opinion on the travel ban was. Following these interviews, the data was presented in the form of three standard contingency tables.

Results:

In the following two way contingency tables, the associations of choice (being race, gender, and age) are juxtaposed with preference poll results (observed values, noted as "O") as well as calculated expected values (noted as "E").

Age

		18-29	30-44	45-64	65+
Support.	**O**	31	17	33	16
	E	41.76	18.27	23.92	13.05
Do Not Support	**O**	51	23	16	7
	E	41.76	18.27	23.92	13.05
No Opinion	**O**	14	2	6	7
	E	12.48	5.46	7.15	3.9

Race

		White	Black	Hispanic	Other
Support	**O**	58	13	20	6
	E	43.93	16.53	24.36	12.18
Do Not Support	**O**	34	19	26	18
	E	43.93	16.53	24.36	12.18
No Opinion	**O**	9	6	10	4
	E	13.14	4.94	7.28	3.64

Gender

		Male	Female
Support	**O**	48	49
	E	44.80	52.2
Do Not Support	**O**	44	53
	E	44,80	52.2
No Opinion	**O**	11	18
	E	13.39	15.61

The data collected in the aforementioned tables was analyzed to see if there exists an association between the three factors and the support preference of the residents. The expected values were calculated with the use of the observed count in their respective table. With the use of the poll results, p-values for each table were calculated using Chi-Square tests. Following the investigation, our results show that gender was the largest P-value at .5362539968. The second largest P-value was had by race, calculated at .011430450. Lastly, our results showed that age in fact has the smallest p-value, meaning that it was most closely related to the resident's preference on the travel ban. Age's p value was calculated to be .0020812835.

Discussion:

Based on the results of our survey, there is a clear and measurable divide between age and race groups when it comes to the topic of the "Muslim" ban. In both instances, support is split directly down the middle as 43.5% of the residents surveyed supported President Trump's order while 43.5% didn't support his actions. As the results are split into groups, however, the divide becomes more evident. Just over 32% of 18-29 year olds and nearly 40.5% of 30-44 year olds support the legislation, but as age continues to rise our evidence shows that the bill garners more and more support. While support is high among the eldest in Suffolk county, with 53% support among those 65 years of age and older, support is highest in the 45-64 year age range with 60% support. This change by age group is drastic.

Furthermore, the divide can be seen between the race groups. Although a majority of whites, at 57%, support the bill, the trend isn't the same amongst the remainder of the race groups. The bill has relatively low support elsewhere, with the only 35% of the hispanic group supporting this executive order and only 34% of African-Americans offering their support. Those that didn't fall under black, white, or hispanic were placed into the "other" category, which only garnered 21.4% support.

Lastly, gender did not play a significant role in the response of the residents. Analysis shows any difference between the two to be marginal, as 44% of women opposed the bill while 42.7% of males were in opposition to the bill. On the other side, 40.8% of women supported the bill while 46% of men were in favor of the legislation. These findings parallel the findings of Jenny Hidalgo and Meagan Molloy, who performed a study on our same factors of race, age, and gender and their relation to voting preference in the 2016 US Presidential election. Their findings show that age and gender played an insignificant role in voting preference in the 2016 election. This is perhaps the most interesting, and surprising, factor of this study, given how polarizing a politician President Donald Trump is perceived to be.

In all, the general response to our poll, being split 50/50, is close to the national average based upon further investigation. According to CBS News, 45% of Americans support the bill while 51% disapprove of the temporary ban. Not all polls point to the majority leaning slightly towards opposing the ban, as per Fox News, who claims using a Quinnipiac University poll that 48% of the American people support the bill and 42% oppose it. Based upon viewer demographic, the numbers are inevitably going to vary but it is safe to say that the country as a whole is divided on the subject.

Conclusion:

While gender was statistically insignificant in terms of it's association to the Muslim Ban with a p-value of nearly 54%, the same cannot be said for both race and age. With the use of both 5% and 10% levels of significance, age had the most significant statistical evidence, with a p-value as low as .2%, to show it's relation to opinion on the Muslim ban. The same can be said for race as well, with another low p-value at 1.1%. In order to further analyze the topic, I would strongly suggest examining other factors such as political party affiliation, religious affiliation, as well as socioeconomic status. The aforementioned factors were not included in our poll.

References:

1. **Bluman, Allan G.** (2014) *Elementary Statistics: A Step by Step Approach: A Brief Version.* Seventh ed. New York: McGraw-Hill Education, n.d.
2. **CBS News.** (2017) "Americans Sharply Divided along Partisan Lines over Travel Ban, Trump: CBS News Poll"
http://www.cbsnews.com/news/americans-sharply-divided-along-partisan-lines-over-travel-ban-trump-cbs-news-poll/
3. **Fox News. (**2017) "Poll: Nearly Half of American Voters Support Trump's Immigration Order"
http://insider.foxnews.com/2017/01/29/poll-nearly-half-america-voters-support-trumps-immigration-order
4. **Quinnipiac University.** (2017) "QU Poll Release Detail"
https://poll.qu.edu/national/release-detail?ReleaseID=2416
5. **Hidalgo, Jenny., Molloy, Meaghan.** (2017) "Association of Age, Gender, and Race with Voting Preference in 2016 Presidential Elections in Suffolk County" SATURN J., Vol 6 No.1, p.28.

Species of Maple Trees are Dominant on Properties of Deer Park and Brentwood on Long Island

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Keywords: Species, Trees, Branches, Maple

Abstract:

A total of thirty-eight tree samples were collected from two residential properties in Deer Park and two properties in Brentwood. The species of trees were identified and confirmed using two dichotomous keys. We measured the circumference of the tree trunks of each tree to get the diameter of each tree trunk. We then used the mobile phone app (leafsnap.com, 2011) and the tree finder book manual by May Theilgaard Watts, (1998) to identify the common names and the scientific names of the trees that we studied. We found that the Sugar Maple (*Acer saccharum*) was found on the both properties of Deer Park. In addition, we found two diverse types of Dogwood trees on the two properties of Deer Park. One is named Flowering Dogwood (*Cornus florida*) and the other tree is named Pink Flowering Dogwood (*Cornus florida).* As for the both properties of Brentwood we found two distinctive types of Maple trees. One is called Silver Maple *(Acer saccharinum)* and the other one is Norway Maple (*Acer plantanoides*). In both properties of Brentwood, we found that the one tree in common is known as the Norway Maple (*Acer plantanoides*). With these findings, we found that the Maple species are dominant on the four properties of Deer Park and Brentwood.

Introduction:

There are distinct species of trees throughout Deer Park and Brentwood. Deer Park and Brentwood are towns located in Long Island, NY. The height above sea level in Deer park is 21.3m. The population in Deer Park is estimated at 27,745. The height above sea level in Brentwood is 23.0m. The population in Brentwood is estimated at 60,664 according to the populations from *https://suburbanstats.org* (2015), and the height above sea levels from freemaptools.com, (2017). On the residential properties of Deer Park and Brentwood the Sugar Maple (Acer sccharum) and the Silver Maple (Acer saccharinum) are the most dominate species out of the other trees that we collected from the residential properties. The Sugar Maple (*Acer sccharum*) grows in deep, well-drained, acidic to slightly alkaline soil. It prefers moist soil conditions but has moderate drought tolerance. According to the Arbor Day Foundation (2017), The Silver Maple (*Acer saccharinum)* Grows in a wide range of soil types but prefers deep, moist, acidic soil. It can withstand some flooding and has moderate drought tolerance.

Method:

We gathered a total of forty tree samples from Deer Park and Brentwood. Fourteen of them were gathered from Deer Park. We used the mobile phone application (leafsnap.com) to identify the common and the scientific names of the tree samples that we gathered. Property #1 in Deer Park has a latitude of 40.7551 and longitude of -73.3387. The height above sea level is 20.8m. Property # 2 in Deer Park has a latitude of 40.7752 and a longitude of -73.3332. Property # 3 in Brentwood has a latitude of 40.7593 and a longitude of -73.2155. Property # 3 in Brentwood has a latitude of 40.757946 and a longitude of -73.227375. We utilized *earthexplorer.usgs.gov* to find the longitude and latitude of each property. To find the height above sea level of each property we used *freemaptools.com*. After naming the common and scientific names, the data was recorded on Tables 1, 2, and 3.

Results:

Table 1 shows the tree species by locations on Deer Park and Brentwood. Table 2 shows tree species by circumference on Deer Park and Brentwood. Table 3 shows tree circumference by location of Deer Park and Brentwood. We found a total of two Sugar Maple (*Acer saccharum*) on properties one and two. The Silver Maple (*Acer saccharinum*) accounted for a total of three trees and was found on properties one and four.

Table 1: Property locations used for tree collection

Property 1: Deer Park	**Property 2: Deer Park**	**Property 3: Brentwood**	**Property 4: Brentwood**
Latitude:40.7551 Longitude: -73.3387	Latitude: 40.7752 Longitude: -73.3332	Latitude: 40.7593 Longitude: -73.2155	Latitude: 40.757946 Longitude: -73.227375
Elevation: 20.8m	Elevation: 27.4m	Elevation: 13.9m	Elevation: 11.4m

Table 2: Property Trees used for tree collection in Deer Park and Brentwood

Common Name	**Scientific Name**	**Quantity #**	**Property**
Flowering Dogwood	*Cornus florida*	**1**	**1**
Sugar Maple	*Acer saccharum*	**2**	**1+2**
Mimosa	*Albizia julibrissin*	**1**	**1**
Callery Pear	*Pyrus calleryana*	**1**	**1**
Emerald Arborvitae	*Thuja occidentalis*	**1**	**1**
Silver Maple	*Acer saccharinum*	**3**	**1+4**
Edible Fig	*Ficus carica*	**1**	**1**
Scarlet Oak	*Quercus coccinea*	**1**	**1**
Douglas-Fir	*Pseudotsuga menziesii*	**1**	**1**
European White Birch	*Betula pendula*	**1**	**1**
Crimson King Maple	*Acer platanoides*	**1**	**1**
Azurri Satin Rose of Sharon	*Hibiscus syriacus*	**1**	**1**
Tatarian Honeysuckle	*Lunicera tatarica*	**1**	**2**
Saucer Magnolia	*Magnolia soulangiana*	**1**	**2**
Coral burst Flowering	*Malus coralcole*	**1**	**2**
Japanese Maple Crab	*Acer palmatum*	**1**	**2**
Australian Pine	*Pinus nigra*	**1**	**2**
Blue Spruce	*Piceapungens*	**1**	**2**
The Athantic White Cedar	*Chamaecyparisthyoides*	**2**	**2+3**
Hazel Alder	*Alnus Serrulate*	**1**	**2**
Pink Flowering Dogwood	*Cornus florida*	**1**	**2**
White Ash	*Fraxinus americana*	**1**	**1**
Pin Oak	*Quercus palustris*	**1**	**1**

Red Cedar	*Juniperus virginiana*	**1**	**3**
Norway Maple	*Acer plantanoides*	**2**	**3**
American Mountain-Ash	*Sorbus americana*	**1**	**3**
Arbor-Vitae	*Thuja*	**2**	**3**
Eastern Hemlock	*Tsuga canadensis*	**1**	**3**
American Elm	*Ulmus americana*	**1**	**4**
Staghorn Sumac	*Rhus typhina*	**1**	**4**
White Pine	*Pinus strobus*	**1**	**4**
Jack Pine	*Pinus banksiana*	**1**	**4**
Sycamore	*Acer Pseudo platanus*	**1**	**4**
White Spruce	*Picea glauca*	**1**	**4**
Norway Maple	*Acer plantanoides*	**1**	**4**

Discussion:

While both residential properties studied here of Deer Park have the Sugar Maple (*Acer saccharum),* another study from (Pagnotta, 2017) found a Sugar Maple (*Acer saccharum)* on the South Shore in Deer Park. Pagnotta also found a flowing Dogwood (*Cornus florida*) in Northport, and the flowering Dogwood (*Cornus florida*) was found in residential property one. We also found another study from (Castro et al. 2017) which reported that there were two Red Maples (*Acer rubrum*) found in Commack. Additionaly, in this study we found that there were three Vine Maples (*Acer cicinatum*) in Bay Shore. Moreover, we also found two Sugar Maples (*Acer Saccharum*) in Bay Shore, and one other study from (Brown and Cosar 2016) found that there was a Japanese Maple (*Acer pulmatum*) in Commack. Lastly, one other study from (Alexander et al. 2016) found that there was a Black Maple (*Acer nigrum*) in Port Jefferson Station. When comparing our results with other tree studies we found that the different Maple trees are dominant on Long Island.

Conclusion:

Among the thirty-eight trees gather on the four residential properties, we found that three of the same species of Maple trees were found in our properties of Deer Park and Brentwood. The Silver Maple (*Acer saccharinum*), Sugar Maple (*Acer sachharum*), and the Norway Maple (*Acer plantanoides*). The Maple species show to be the dominant trees identified.

Reference:

1. **Belhumeur and P., Jacobs D.** 2017. *Leafsnap*, Columbia University, University of Maryland, Smithsonian Institution. http://leafsnap.com/.
2. **Earth Explorer.** 2017. Latitude and Longitude Finder, earthexplorer.usgs.gov.
3. **Free Map Tools.** 2017. Elevation Finder, freemaptools.com.
4. **Leccese M.** 2017. Homegrown: Native Long Island Tree Species, Long Island *Tree Trimming*, The Arbor Day Foundation.
5. **Ayasse, J., Pedone, D., Urbano, T.,** 2017. Oak Trees are Dominant on the North Shore while Pine Trees are Dominant on the South Shore and White Pine is found on both Shores of Long Island, New York, *SATURN J.*, Vol. 6, No. 1, pp. 6-9.
6. **Pagnotta, C.,** 2017. Coniferous Trees are Dominant on the North Shore and Deciduous Trees are Dominant on the South Shore of Long Island, *SATURN* J., Vol. 6, No. 1, pp. 31-34.
7. **Suburban Status**. 2017. Deer Park and Brentwood population Finder, https://suburbanstats.org
8. **Castro., Depasquale., Hinsch., Morales.,** 2017. Non-native Trees and Maples are Prevalent in the towns of Commack, Bay Shore and Lindenhurst, SATURN *J.*, Vol. 6, No. 1, pp. 10-14.

9. **Brown., Coser.,** 2016. Red Maples are a Dominant Species on the North Shore and South Shore of Long Island while Spruces and Vitaes are Dominant on the North Shore and Oaks on the South Shore, SATURN *J.*, Vol. 5, No. 1, pp. 17-19.
10. **Alexander K., Mirabito P., Lerro D, Odeh V., Carrion J., Gherardi A., Green E.,** 2016. Native Trees Outnumbered Non-Native Trees on some Residential and Non-Residential Properties across Long Island, SATURN *J.*, Vol. 5, No. 1, pp. 26-30.

White Pine Trees and Maple Trees are Dominant on Two Residential in the Towns of Commack and Northport

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Keywords: White Pine, Maple, Northport

Abstract:

A total of 41 trees were sampled from 2 different residential properties on the North Shore of Long Island. A dichotomous key was used to classify the species by tree branches.White Pine trees and Maple Trees were dominant on both locations on the North Shore.

Introduction:

There are many factors that affect the different types of trees in certain areas, such as climate and elevation. According to The Weather Channel (2017), in Commack, the average precipitation is 9.9 cm and the average temperature is 15.5 degrees Celsius. The average temperature in Northport is 11.6 degrees Celsius and the average precipitation is 9.1 cm. The height above sea level in Commack is 39.9 m and the height above sea level in Northport is 17 m. The population in Commack is 36,124 and the population in Northport is 7,405. The dichotomous key allows us to find the identity of a tree and it's species by its characteristics. It can also help us determine if the tree is native or non-native to the area. A dichotomous key is a tool that allows us to identify an item. In this case, we used the key to identify trees. The dichotomous key was the primary resource used to identify the tree specimens.

Method:

Two students took specimens of each tree found on their residential properties in Commack and Bayshore, resulting in 41 trees all together. The students were able to identify the different tree species by using a dichotomous key (Watts 1991) and a smartphone application called Leafsnap (Columbia University). The property located in Commack is 1214 m². The property located in Northport is 1375 m² (zillow.com). The elevation of each property was found using earthexplorer.usgs.gov.

Results:

Trees found in Commack at 40.867654, -73.265389 were Red Cedar (*Juniperus virginiana*), three White Pine (*Pinus strobus*), two Arbor Vitae (*Thuja occidentalis*), two Horse Chestnut (*Aescelus hippocastanum*), Pin Cherry (*Prunus pennsylvania*), two American Beech (*Fagus grandifolia*), Sweet Buckeye (*Aesculus octandra*), two Flowering Dogwood (*Cornus florida*), Common Lilac Tree (*Syringa vulgaris*), two Live Oak (*Quercus virginiana*) and two Sugar Maple (*Acer saccharum*).

Trees found in Northport at 40.900931, -73.343173 were three Sugar Maple (*Acer saccharum*), Tree of Heaven (*Ailanthus altissima*), ten Bald Cypress (*Taxodium distichum*), *Ginko Bilboa*, three Green Ash (*Fraxinus pennsylvanica*), White Willow (*Salix alba*) and two White Pine (*Pinus strobus*).

Sugar Maple (*Acer saccharum*) and White Pine (*Pinus strobus*) were the only two species found on both properties. Sugar Maple (*Acer saccharum*) was 12% of the total and White Pine (*Pinus strobus*) was 9%. Bald Cypress (*Taxodium distichum)* made up 24% but was only found on one property.

Table 1: Trees found at the study site in Commack

Type of Tree	**Scientific Name**	**Percents**
Red Cedar	*Juniperus virginiana*	2%
White Pine (3)	*Pinus strobus*	7%
Arbor Vitae (2)	*Thuja occidentalis*	4%
Horse Chestnut (2)	*Aescelus hippocastanum*	4%
Pin Cherry	*Prunus pennsylvania*	2%
American Beech (2)	*Fagus grandifolia*	4%
Sweet Buckeye	*Aesculus octandra*	2%
Flowering Dogwood (2)	*Cornus florida*	4%
Common Lilac	*Syringa vulgaris*	2%
Live Oak (2)	*Quercus virginiana*	4%
Sugar Maple (2)	*Acer saccharum*	4%

Table 2: Trees found at the study site in Northport

Type of Tree	**Scientific Name**	**Percents**
Sugar Maple (3)	*Acer saccharum*	7%
Tree of Heaven	*Ailanthus altissima*	2%
Bald Cypress (10)	*Taxodium distichum*	24%
Ginko	*Ginko Bilboa*	2%
Green Ash (3)	*Fraxinus pennsylvanica*	7%
White Willow	*Salix alba*	2%
White Pine	*Pinus strobus*	2%

Discussion:

In this study, the most popular genus recorded were *Acer* and *Pinus,* with 9 samples all together. At least one *Acer* was found on each property and at least one *Pinus* was found on each property within the towns of Commack and Northport. Only one species of *Acer* and *Pinus* were found. Castro et al.

(2017) also identified *Acer* species in Commack, and also in Bayshore and Lindenhurst, with 2 trees. Castro et al. (2017) also recorded 3 trees of genus *Pinus* in Bayshore, and Molly et al. (2016) noted the genus *Acer* in the town of Commack with a total of four trees. *Acer* was also found in Huntington Station according to Matarazzo and Italiano (2016). According to these findings, it shows that *Acer* is a dominant genus of tree on Long Island, along with *Pinus* being prevalent but not as prevalent as *Acer.*

Conclusion:

The investigators were able to use a dichotomous key to accurately classify forty one different trees from across Long Island, in the towns of Commack and Northport. Upon identifying and collecting 41 tree samples from Commack and Northport, it was found that 10% of trees found were of the *Pinus* genus and 12% were of the *Acer* genus. From this data, and the data of previous investigators, we can conclude that Maple and Pine trees are two of the more prevalent trees on the North Shore of Western Suffolk, Long Island.

References:

1. **Castro, J., DePasquale, D., Hinsch, B., Morales, S.,** (2017)**.** Non-native Trees and Maples are Prevalent in the towns of Commack, Bay Shore and Lindenhurst. *SATURN J.*, 6(1), 10-14.
2. **Jacky, J, Lin, J., Vishayanuroj, P.,** 2011. Leafsnap. Columbia University.
3. **Matarazzo, N., Italiano, J.,** (2016). Maple Tree Dominance in Huntington Station. *SATURN J.*, 5(1), 20-22.
4. **Molloy, M., Cirabisi C., Rivera, E., and Wheeler, E.** (2016). Maple Trees Show Dominance Over a Variety of Species in Residential Areas in Kings Park, Commack, Brentwood, and Central Islip on Long Island, New York. *SATURN J.*, 5(1), 31-35.
5. **Watts, May Theilgaard** (1991). Tree Finder: A Manual for the Identification of Trees by Their Leaves. Rochester, NY: Nature Study Guild. Print.

Maple and Arborvitae Dominate Coniferous Trees and Shrubs from a Dominated Deciduous Residential Property in Ronkonkoma, New York

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Keywords: Biology, tree, shrub, species, Suffolk, New York

Abstract:

Two students collected 45 samples from each tree and shrub on a residential property in Ronkonkoma, New York. The species of trees and shrubs were identified and confirmed using two dichotomous keys. The tree species found are Northern White Cedar *(Thuja occidentalis),* Red Maple *(Acer rubrum),* Bradford Pear *(Pyrus calleryana* 'Bradford'*),* Norway Maple *(Acer plantanoides),* and the Eastern Hemlock Dwarf *(Tsuga canadensis).* The shrub species found are Little Giant Arborvitae *(Thuja occidentalis* 'Little Giant'), and the Forsythia Lynwood Gold *(Forsythia x intermedia).* The results show that there was a representation of many different species, yet the majority of the samples came from Arborvitae shrubs and Maple (*Acer*) trees.

Introduction:

The weather continuously changes on Long Island; consequently it may change the types of trees that are able to grow on Long Island. According to the Farmer's Almanac (2017) the annual climate average for Suffolk County, NY is 16 degrees Celsius. The species of trees and shrubs found on the property are the Northern White Cedar (*Thuja occidentalis*) which grows to a height of 15 meters tall. The Red Maple *(Acer rubrum)* as the tree grows the bark becomes darker and cracks into slightly raised long plates (Petrides, 1988). The Bradford Pear (*Pyrus calleryana* 'Bradford') This tree has a glossy dark green foliage which turns scarlet-purple in the Fall, Norway Maple (*Acer plantanoides*) which can grow 12-18 meters in height, and the Eastern Hemlock Dwarf *(Tsuga canadensis*) Their needles are 5-23 centimeters long. The shrub species found are Little Giant Arborvitae (*Thuja occidentalis* 'Little Giant'), a small, globe-shaped evergreen shrub that has very soft foliage, and the Forsythia Lynwood Gold (*Forsythia x intermedia*) that has leaves borne oppositely and are usually simple, though sometimes trifoliate with a basal pair of small leaflets. (Kershner et al. 2008).

Methods:

A sample of each tree and shrub was taken from the residential property at 89 Forest Drive, Ronkonkoma NY 11779. Two dichotomous keys (Watts 1998, Taylor 1993) helped determine the species of the trees and shrubs. A residential land survey was obtained and used to show where the tree and shrubs are located.

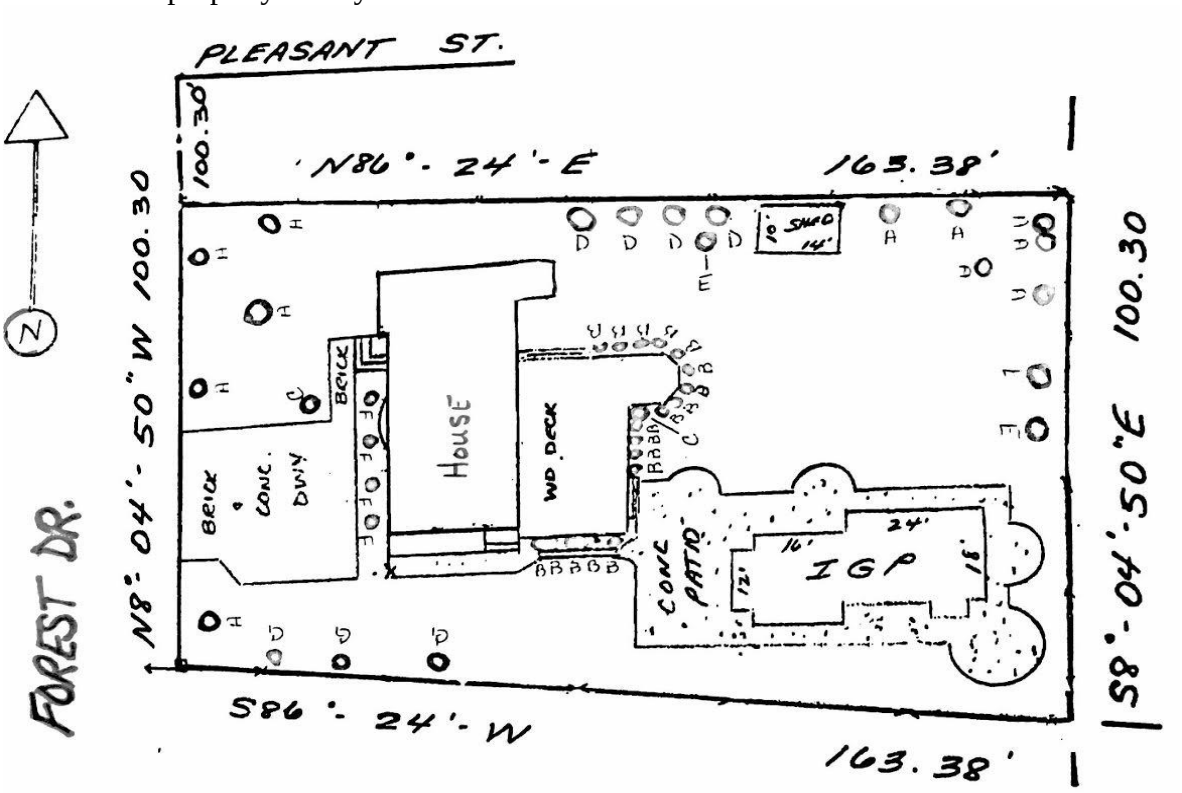
Results:

Based on the data that we collected from the residential property location in Ronkonkoma, we came to the conclusion there is a greater diversity of tree species rather than shrub species in the area. Out of the five tree species and the two shrub species that we had collected on the property, we found there was one Arborvitae (*Thuja occidentalis*) shrub species that was dominant on the property. It was found that 26 trees and shrubs identified as coniferous and 19 were found to be deciduous. Out of the 45 tree and shrub samples that were collected it was found that all 45 samples belong to non-native species of the areas.

Table 1: Trees & Shrubs located on 89 Forest Drive, Ronkonkoma, NY 11779

Location	Common Name	Scientific Name	Tree/Shrub	# of Trees & Shrubs
A	Norway Maple	*Acer platanoids*	Tree	11
B	Little Giant Dwarf Arborvitae	*Thuja occidentalis*	Shrub	18
C	Red Maple	*Acer rubrum*	Tree	2
D	Northern White Cedar	*Thuja occidentalis*	Tree	4
E	Bradford Pear	*Pyrus callerana*	Tree	3
F	Eastern Hemlock Dwarf	*Tsuga canadensis*	Tree	4
G	Forsythia	*Forsythia x intermedia*	Shrub	3

Figure 1: Photo of property survey and location of trees and shrubs



Discussion:

Many trees that currently inhabit Long Island are not native to the area. The Norway Maple *(Acer platanoides)* is originally from eastern and central Europe as well as southwest Asia, France, east to Russia, north and southern Scandinavia and southeast to northern Iran (Taylor, 1993). The Eastern Hemlock (*Tsuga Canadensis)* is firstly native to Minnesota eastward through southern Quebec to Nova Scotia, and south in the Appalachian Mountains to northern Georgia and Alabama (Taylor, 1993). *Thuja occidentialis* and the *Acer* are widespread throughout Suffolk County. Further research suggests the *Acer* is a dominant genus of trees on Long Island. These results were also found in another study that focused on the dominance of maple trees in Suffolk County, in which it was discovered that although these trees are not native here, there are an abundance of maple trees that inhabit residential areas of Long Island. "Maples including several species that grow into large shade trees, are commonly planted as part of Long Island landscapes. The most common large Maples include the Red Maple,

Sugar Maple, Norway Maple and Silver Maple"(Desiree Perez and Brenda Fuentes 2015). In addition the study concluded that forty-one percent of the specimen's collected were Maples belonging to the genus Acer (Desiree Perez and Brenda Fuentes 2015). Specifically, Maple trees in the area of Ronkonkoma were found to be dominant in this study.

Conclusion:

The trees and shrubs found on the study at 89 Forest Drive, Ronkonkoma, NY were: Northern White Cedar *(Thuja occidentalis*), Red Maple (*Acer rubrum*), Bradford Pear *(Pyrus calleryana*), Norway Maple *(Acer plantanoides*), and the Eastern Hemlock *Dwarf (Tsuga canadensis*). The shrub species found are Little Giant Arborvitae (*Thuja occidentalis*), and the Forsythia Lynwood Gold *(Forsythia x intermedia*). The dominant species found were the *Thuja occidentalis,* a coniferous evergreen species and Maple (*Acer*) Trees.

References:

1. **Watts, Theilguard, May** 1998. *Tree Finder A Manual For The Identification of Trees by Their Leaves.* Rochester: Nature Study Guide Publishers, 1998
2. **Taylor, Ronald J**. 1993. *Flora of North America Vol. 2*, Oxford University Press
3. **Kershner Bruce, Mathews Daniel, Nelson Gil, and Spellenberg Richard.** 2008. *Field Guide to Trees of North America.* New York: Sterling Publishing Co., Inc.
4. **Petrides A. George.,** 1988. *Eastern Trees:* Boston, NY: Houghton Mifflin Company.
5. **Farmer's Almanac,** 2017, *Weather History:* Ronkonkoma, NY : http://www.almanac.com/weather/history/NY/Ronkonkoma/2017-04-14
6. **Perez, Desiree, and Brenda Fuentes**. *Maples Are a Dominant Genus in North, Central and South Shore Long Island in SuffolkCounty,*. Rep. Saturn Journal, n.d. Web. 2015. http://www.saturnjournal.org./Past/Saturn_Aug_2015.pdf

Trees with Asian Origins are the Most Dominant in Bay Shore and Brentwood While Maple Trees are the Most Dominant Native Tree

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Keywords: North, West, Southeast, Bay Shore, Brentwood, Trees, Dichotomous key

Abstract:

Students did a survey on Long Island to collect data from different tree species on the island. A total of 48 tree samples were collected from four different residential areas on Long Island. These residential areas were North Bay Shore, West Bay Shore, North Brentwood and Southeast Brentwood. The students were able to identify the common name, as well as their scientific name with the help of a dichotomous key application. The research showed most of the native locations of these trees were in parts of Asia. The second most common location was the Americas, then Europe, and lastly Africa.

Introduction:

Long island is considered one of the best plant producing areas in New York State (Welmore 2016). There is a wide variety of trees that are native to all parts of the world scattered throughout Long Island due to residents planting foreign trees. Among the most popular trees found on Long Island, the different species of Maple trees are one of the only ones that are actually native to the island (Welmore 2016). The most common is the Red Maple (*Acre rubrum*) which is known for its deep red color that makes it stand out from other trees, and for being able to survive through harsh, cold weather year round. Many trees in the Long Island areas studied are predominantly from parts of Asia, such as the Japanese Maple (*Acer palmatum*) as well as some that are native to different parts of Europe, such as the European Larch (*Larix decidua*), and to different parts of the United States, such as the Black Locust (*Robinia pseudoacacia*).

Method:

Four students collected information on this survey. They collected samples from several species of trees from four different residential properties that are in North Bay Shore, West Bay Shore, North Brentwood, and Southeast Brentwood, resulting in 48 tree samples. They were able to identify all the samples by using smartphone applications such as vTree (Peterson 2016), Leafsnap (Columbia University 2015), and the dichotomous keys (Watts 1991, Petrides and Wehr 1998). The latitude and Longitude of each property examined for tree samples were identified using the EarthExplorer website (USGS 2011).

Results:

Table 1 provides information on the areas that were examined for tree samples. The latitude, longitude and elevation of each area was recorded using EarthExplorer.

Table 1 : Properties where tree samples were collected

Locations:	Property 1; North Bay Shore	Property 2: North Brentwood	Property 3: Southeast Brentwood	Property 4: West Bay Shore
Latitude:	40.759809	40.785140	40.766622	40.716710
Longitude:	-73.243494	-73.245652	-73.227671	-73.274474
elevation	18m / 59 feet	29m / 95 feet	17m / 56 feet	9m / 30feet

Table 2 shows the samples that were collected in North Bay Shore, New York. Theses samples include, Red Mulberry (*Morus Rubra),* Japanese Maple *(Acer palmatum),* Northern Catalpa (*Catalpa speciosa),* Fall Red (*Seminar Undinaria*), European Larch *(Larix Decidua),* Yew (*Taxus)*, Holly (*Hoogdendoorn*), Gold Splash Wintercreeper *(Eunonymus fortunei),* Red Maple Tree (*Acer rubrum)*, Eastern Red Cedar *(Juniperus virginiana),* Pitch Pine *(Linus rigida),* Silver Maple (*Acer saccharinum)*, Cherry Blossom *(Prunus serrulata).* The native locations were eastern North America, central North America, Japan, China, Mongolia, Russia, central Europe, Africa, Gulf of Mexico, and Canada.

Table 2: Trees found in North Bay Shore, New York

Type of Tree	**Scientific Name**	**Quantity**	**Native Location**
Red Mulberry	*Morus rubra*	1	Eastern and central North America
Japanese Maple	*Acer palmatum*	1	Japan, China, Korea, eastern Mongolia, and southeast Russia
Northern Catalpa	*Catalpa speciosa*	1	Midwestern United States
Fall Red (bamboo tree)	*Semiar undinaria*	1	China and Japan
European Larch	*Larix decidua*	1	Central Europe
Yew	*Taxus*	1	Europe, Africa, Asia
Holly	*Hoogendoorn*	1	United States
Gold Splash Wintercreeper	*Eunonymus fortunei*	1	East Asia
Red Maple Tree	*Acer rubrum*	1	North America
Eastern Red Cedar	*Juniperus virginiana*	1	Southeastern Canada, Gulf of Mexico
Pitch Pine	*Linus rigida*	1	Eastern North America
Silver Maple	*Acer saccharinum*	1	Eastern and Central North America , Canada

Cherry Blossom	*Prunus serrulata*	1	Japan, Korea, China

Table 3 shows the tree samples taken from North Brentwood, New York. These samples include, Pine Tree (*Norway spruce*), Cherry Blossom (*Prunus serrulata*), Japanese Maple *(Acer palmatum),* Silver Birch
(Betula pendula), Northern White-Cedar (*Thuja occidentalis)*, Yew (*Taxus*), Blue Star Juniper (*Juniperus squamata),* Autumn Fern (*Dryopteris erythrosora),* European Larch (*Larix decidua*), Spartan Juniper *(Juniperus chinensis)*. The native locations were northern, central, eastern Europe, Japan, Korea, China, Mongolia, Russia, Canada, Africa, Himalayas, and the Philippines.

Table 3: Trees Found in North Brentwood, New York

Type of Tree	**Scientific Name**	**Quantity**	**Native Location**
Pine Tree	*Norway spruce*	1	Northern, central, and eastern Europe
Cherry Blossom	*Prunus serrulata*	2	Japan, Korea, China
Japanese Maple	*Acer palmatum*	1	Japan, China, Korea, Mongolia, and Southeast Russia
Silver Birch	*Betula pendula*	2	Europe, Asia
Northern White-Cedar	*Thuja occidentalis*	2	Eastern Canada
Yew	*Taxus*	2	Europe, Africa, Asia
Blue Star Juniper	*Juniperus squamata*	3	Himalayas, China
Autumn Fern	*Dryopteris erythrosora*	2	China, Japan, Philippines
European Larch	*Larix decidua*	1	Central Europe
Spartan Juniper	*Juniperus chinensis*	2	China, Mongolia, Japan, Russia

Table 4 shows tree samples from Southeast Brentwood, New York. The samples include, Northern White-Cedar (*Thuja occidentalis)*, Northern Catalpa (*Catalpa speciosa)*, Green Luster Holly (*Ilex Crenata green luster)*, Red Maple (*Acer rubrum)*, Fairy wings (*Epimedium x youngianum roseum).* The native locations are eastern Canada, midwestern United States, Japan, North America, Asia, and the Mediterranean.

Table 4: Trees Found in Southeast Brentwood, New York

Type of Tree	Scientific Name	Quantity	Native Location
Northern White-Cedar	*Thuja occidentalis*	1	Eastern Canada
Northern Catalpa	*Catalpa speciosa*	1	Midwestern United States
Green Luster Holly	*Ilex Crenata green luster*	1	Japan
Red Maple	*Acer rubrum*	1	North America
Fairy wings	*Epimedium x youngianum roseum*	1	Asia and Mediterranean

Table 5 shows tree samples from West Bay Shore. These samples include, Silver Maple (*Acer saccharinum*), Silver Birch (*Betula pendula*), Sugar Maple (*Acer saccharum*), Colorado Blue Spruce (*Picea Pungens glauca*), Green Luster Holly (*Ilex Crenata green luster*). The native locations are eastern North America, Europe, Asia, eastern Canada, western United States, and Japan.

Table 5: Trees found in West Bay Shore, New York

Type of Tree	Scientific Name	Quantity	Native Location
Silver Maple	Acer saccharinum	4	Eastern North America
Silver Birch	*Betula pendula*	3	Europe, Asia
Sugar Maple	*Acer saccharum*	2	Eastern Canada
Colorado Blue Spruce	*Picea Pungens glauca*	1	Western United States
Green Luster Holly	*Ilex Crenata green luster*	3	Japan

Out of the 48 tree samples recorded, 27, or 56% of all the samples, have origins from different parts of Asia. 6, or 13% of the samples have origins from different parts of Europe, 15, or 31% of the tree samples originate from North America.

Discussion:

In this survey at least one of each tree species was found in two out of four residential properties. Five genuses were found on all four of the residential properties that were from three different species. They are *Juniperus, Acer*, and *Thuja*. Castro et al. (2017) found the genus *Acer* in Bay Shore, Commack, and Lindenhurst. Bay Shore had a total of nine trees. Commack had two trees,

and Lindenhurst had one tree. Also according to Sosa et al. (2017) the genus *Acer* was found in Holbrook with one tree. Castro et al. (2017) found the genus *Thuja* with a total of one tree in Bay Shore. In Northport and Brentwood a total of two trees were identified genus *Thuja* according to Pagnotta (2017). Sosa et al. (2017) identified the genus *Juniperus* in Holbrook and Hauppauge with three trees. Three trees of the genus *Juniperus* was identified in Lindenhurst according to Yodice et al. (2017). Pagnotta (2017) found the genus *Juniperus* with a total of seven trees in Bay Shore. This shows that the genuses of *Juniperus*, *Acer*, and *Thuja* have been found in several locations along Long Island.

Conclusion:

The Maple tree species and the Pine tree species were fairly common throughout the island. Both of the species were seen in three-fourths of the locations. Maple (*Acer)* were found North Bay Shore, North Brentwood, and Southeast Brentwood; while the Pine (*Pinus)* were found in West Bay Shore, North Brentwood, and North Bay Shore. Among the results, most of the trees were from Asians origins (56%) while the *Acers* (22%) were the most dominant throughout the Bay Shore and Brentwood areas.

References:

1. **Belhumeurand P., Jacobs D.** (2016) Leafsnap, Columbia University, University of Maryland, Smithsonian Institution. http://leafsnap.com/
2. **Castro, J., DePasquale D., Hinsch B., Morales S.** (2017) Non-native Trees and Maples are Prevalent in the towns of Commack, Bay Shore and Lindenhurst. *SATURN J*., 6(1), 10-14.
3. **Pagnota, C.** (2017) Coniferous Trees are Dominant on the North Shore and Deciduous Trees are Dominant on the South Shore of Long Island. *SATURN J.* 6(1), 31-34.
4. **Peterson, J.** (2016) vTree, Virgina Tech University, Department of Forest Resources and Environmental Conservation.
5. **Sosa J., Vero A., Sbarro P.** (2017) Trees with Compound Pinnate Leaves Are Dominant over a Variety of Different Species Found in Residential Areas in Central Suffolk County. *SATURN J.*, 6(1), 41-45.
6. **Survey, USGS** (2011) U.S. Geological. *EarthExplorer*, U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) https://earthexplorer.usgs.gov/
7. **Watts, May Theilgaard** (1991). Tree Finder: A Manual for the Identification of Trees by Their Leaves. Rochester, NY: Nature Study Guild. Print.
8. **Welmore, J.** (2016) "4 Types of Trees on Long Island." *Tree Removal Long Island*. http://treeremovallongisland.org/
9. **Yodice, J., Swetokos, M., Ortiz M., McGuire,. M.** (2017) Introduced Tree Species Prevail Over Native Tree Species in Residential Properties of Commack, Babylon and Lindenhurst. *SATURN J.*, 6(1), 49-52.