

Mini!

Science
Fest

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Dawson College – December 2015

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Welcome

On behalf of all your Biology teachers, welcome to the December 2015 edition of ScienceFest! You have all worked very hard all semester; planning, discussing, planting, observing, growing, tabulating, calculating, writing and all your hard work has culminated to this point. A large part of scientific research is being able to communicate your experiment and results to others. We hope you enjoy the variety of the projects on display and take the opportunity to socialize and discuss your projects with each other as well as other member of the Dawson community.

Instructions to Participants

Posters can be attached directly to the wall using sticky-tack or tape. They can be intalled anywhere along the 5C East hallway (opposite the library entrance, in the hallway closer to the Biology labs).

Poster set-up – Monday, December 7, 8am

Poster take-down – Monday, December 14, 5pm

Your teachers may have specific instructions/assignments linked to the presentation of your poster. Please consult with them for any evaluations.

Biology NYA CE Projects – Abstracts for Posters

Are Pain Killers Really Beneficial?

Simona Oppedisano, Jessica Asfour

Teacher: Jeffrey K.L. Eng

One may think that aspirin, Tylenol or Advil is a strange combination with plants. But if they have a positive effect on humans by relieving pain, does it also mean they have a positive effect on plants? While observing the growth rate of wheat plants including a control group given regular water and experimental groups given a solution containing water and either aspirin, Tylenol or Advil, it was observed that the effects of these pills on the wheat plant were negative. Growth rate was higher in the control group which received regular water, whereas the experimental group showed results of less healthy growth rate.

Aspirin Response in Catgrass (*Avena Sativa*): The Germination Period of Cat Grass in Response to Aspirin

Sara Boudiwane, Aileen Joy Galutira, Georgiana Andra Liciu, and Pavitha Maheswaran

Teacher: Jeffrey K. L. Eng

The purpose of the experiment was to determine if aspirin has any effect on the growth and germination of catgrass or *Avena Sativa*. 20 seeds of catgrass was planted into two identical pots, the two pots had 10 seeds each. The pots were subjected in the same conditions like temperature, sunlight exposure, environment setting and water quantity. However, the experimental pot was watered with a diluted solution containing Acetylsalicylic acid or Aspirin while the control pot was only administered with plain tap water. They were watered every 4 days for a period of 5 weeks. The seeds in the experimental pot germinated faster than the seeds in the control pot, but the growth rate of each base on their shoot length was approximately identical. By analyzing the data and results, it is concluded that aspirin does help plants germinate faster, however it does not help in shoot elongation, but the plants with aspirin were visually healthier.

Comparison of a magnolia and a paper birch tree exfoliation dynamics

Milan Vucetic, Mathieu Vachon, Pui Han Wu

Teacher: Jeffrey K.L. Eng

The aim of the project was to observe exfoliation of two trees of different origin, growing in the same yard. A tree of *Magnolia kobus* var. *stellata* and a paper birch tree were observed for changes in leaves hue and exfoliation from 16 September to 30 October 2015. The observation was supported by data collection and photos, taken every five-six days (nine pairs of photos). Data collected were qualitative (sunny weather, overcast, rain, wind, leaves hue) and quantitative (temperatures' high and low values for 45 days, approximate percentage of exfoliation according to photos obtained). The trees exfoliated in the same time but at the different pace. Also, the paper birch tree leaves were changing their hues gradually and continuously while the magnolia leaves stayed for a longer period green and did not go through orange-red gradient of discoloration. High wind gusts of 60km/h on 18 – 19 October were sufficient to blow off the majority of leaves from both trees. *Magnolia kobus* var. *stellata* and paper birch are trees of different sites of origin, the first originally distinguished in warm climate and the latter in continental climate. Both species did not show differences in the timing of complete exfoliation but had rather variable rhythm toward complete exfoliation.

Bathroom Surfaces

Julia Longo, Rebecca Dohnal, Daneeshan Srithar, Shayne Caza

Teacher: Jeffrey K.L. Eng

The purpose of this experiment was to determine which bathroom surface is home to the largest number of bacterial colonies. Six surfaces in the average bathroom were cultured for bacteria growth. The bacteria was collected with a sterile cotton tip, cultured on a soy agar plate and left to grow for five days. Five days later, the data was collected by counting the colonies present on each soy agar plate. The toothbrush resulted in the greatest amount of bacterial colonies present and the toilet water resulted in the least. In the end, the results gave a clear ranking of the bathroom surfaces that the average person is exposed to on the daily basis in need of the most cleaning.

Effects of Caffeine on an Individual's Problem Solving Ability

Kaitlin Thomas, Sabrina Caniglia, Zachary Bys, Michael Gagnon

Teacher: Jeffrey K.L. Eng

The purpose of this experiment was to determine if caffeine truly has an effect on a person's ability to concentrate and/or solve a problem. In our specific experiment we chose to evaluate the effect that caffeine would possibly have on non-coffee drinking while solving some kind of a puzzle, in this case being the level Intermediate 5 from the game Unblock Me. A total of twelve people who are not coffee drinkers were randomly given either caffeinated or decaffeinated coffees. Each subject was given a total of ten minutes to drink the coffee. The reason why the specific amount of 10 minutes was given to each subject to drink the coffee, is because our research lead us to believe that coffee takes about 10 minutes to start having effects of it's drinker. The subjects were then taken to a new table and handed the electronic game Unblock Me, where they had a maximum of three minutes to complete it. The experimental group took less time to solve the puzzle compared to the control group, but our results imply the null. Caffeine is not an effective drug for exams and studying, because it does not affect a person's cognitive function.

Kidney Bean Plant Growth Under Different Colored Light

Emil Levkovsky, Ariel Avital, Mathieu Canuel, Daniel Mamane

Teacher: Jeffrey K.L. Eng

Plants use energy coming from light in order to go through photosynthesis which enables plant growth and survival. The purpose of the experiment conducted was to determine whether or not the color of light, which associated with the wavelength of that light color (and in consequence energy of that light), affects the vertical growth of the kidney bean plant. Using 3 sets of 4 kidney bean plants, each set was placed in its own pot filled with soil and placed under a specific colored light (a red LED lamp, a blue LED lamp and a control fluorescent lamp) and had the vertical growth of the shoots measured for a month. All 3 sets of beans were in the exact same environment, having exact same conditions put on them other than the different lighting. The vertical growth of the plants was measured and the results showed that the mean value of the four kidney bean plants subjected to the blue LED light exhibited the most vertical growth, then followed by the mean value of the four kidney bean plants subjected to the red LED light followed by the mean value of the four kidney bean plants subjected to the control fluorescent light. Based on the results observed, the different lighting used for the growth of kidney bean plants did not impact the vertical growth of kidney bean plants. There was a high standard deviation in the vertical height of the bean plants per lighting condition, leading to the conclusion that the different lighting conditions done in this experiment does not impact the vertical height growth of bean plants.

M&M: Music and Math

Rea Sharma, Rachele Valentim, Katya Zappitelli

Teacher: Jeffrey K. L. Eng

The purpose of this experiment was to determine how the presence of music can affect one's intellectual abilities and their level of concentration. To conduct this study, 32 students were subdivided into two groups. In group A, the control group, members individually conducted a series of mathematical word problems without music while group B, the experimental group, did so with music. The average amount of correct answers of students with music was slightly greater than the average amount of correct answers of students without music. However, despite the slight difference between the two, the data was not consistent enough to show that music had a significant effect on the participants. Therefore, the results demonstrated that the playing of music had no effect on the participant's concentration.

Microwave Me Away

Brittany Burke, Emily Gosas, Victoria Sabatino, Jennifer Toye

Teacher: Jeffrey K.L. Eng

The purpose of this project is to determine the effect of microwave radiation on the growth of bacteria from rotted fruit. Bacteria from rotted fruit were swabbed onto four different homemade agar dishes. Three of the rotted raspberries were microwaved for a predetermined amount of time in seconds (10 seconds, 30 seconds and 60 seconds) and one raspberry was not microwaved and was used as a control. These were then swabbed and applied on individual agar dishes. Three trials were conducted. The dishes were then held in constant conditions for five days before they were thoroughly analyzed and the results were observed. Three t-tests were conducted comparing each experimental group to the control group. The results of this test demonstrated that our results support our hypothesis, that microwave radiation does indeed kill bacteria.

The Effects of Cobalt-60 Radiation on Radish Seeds

Dean Rekkas, William Bergamin, Jade Parent, Karine Attias

Teacher: Jeffrey K. L. Eng

Radish seeds were used as the model organism for all eukaryotes in order to observe and determine the effects radiation has on development and growth of living organisms. Cobalt-60 a radioactive isotope was used as a radiation source for the experiment. Its radioactive nature emits high frequency gamma rays with high penetrating capabilities capable of inducing severe damage at the cellular level. Several health issues have been correlated with radiation exposure and this experiment serves to determine if this radiation source produces a negative effect on the seeds. Based on the negative effect of radiation, it was hypothesized that the increasing levels of Coablt-60 radiation exposure on the seeds would stunt their growth and reduce germination rates. This hypothesis was tested by germinating four experimental groups (already exposed to the radiation) of increasing radiation levels from 50krads to 4000krads, and one control group unexposed. Chi squared test results rejected the null hypothesis for germination rates, and several T-tests between control versus experimental shoot and root lengths rejected the null as well. These results comply with the hypothesis and indicate that radiation, especially with increasing dosage produce severe health risks in living organisms. Further studies on prevention and alternate methods of anatomical viewing on live specimens should be performed.

Music and Concentration

Daniel Epstein, Dylan Blatt, Anaelle Plaza, Zoe Nahminash

Teacher: Jeffrey K.L. Eng

As one may notice when walking in the Dawson library, everyone has earphones in their ears and as different styles progress their popularity increases. As students, some of us may wonder if the use of music, or specific types of music, may affect one's ability to maintain concentration while studying. In an effort to establish a relationship between concentration and music, three series of similar tests were conducted with twenty-two students. Each test involved 10 arithmetic math questions and different auditory stimuli: silence, classical music, and the music of their choice, respectively. Once the data was extrapolated, the T-statistics determined that there was relatively no change in the mark on tests written with and without music. In other words, contrary to our belief the data would suggest that there is no correlation between enhancing or degrading concentration and the exposure to music.

Seed Crowding and Percent Yield

Kayleigh Chagnon, Kristina Kostadinova

Teacher: Jeffrey K.L. Eng

This study measures the differences in growth and yield between three different grass seed densities. Understanding how densely seeds can be placed in order to optimize the yield from a piece of land is an important question in farming. In order to study this, grass seeds were sprouted in earth at different densities. A control was compared to two experimental groups which had higher and lower densities compared to the control. A faster sprout rate and faster growth in the high-density group was observed compared to the control and lower-density group. Both experimental groups had higher percent yields than the control but the T-test shows that only the group with more dense seeds had significant results. The group with more densely placed grass seeds had a better yield than the control.

The Effect of Omega-3 Supplements on Humans: Can It Improve Our Memory?

Bianca Colalillo, Tiffany Ruggeri, Ilanie Elharrar

Teacher: Jeffrey K.L. Eng

A common perception related to Omega-3 supplements is that they increase memory efficiency. A group of 16 subjects was used to determine the effect of Omega-3 supplements on short-term memory. This experiment was conducted by giving 8 of the subjects Webber Naturals 900 mg Omega-3 supplements and giving the other 8 subjects placebo sugar pills to take for 30 consecutive days. All 16 subjects received consistent scores on all three memory tests taken throughout the month. The concluding results disproved the hypothesis and therefore accepted the null, if the individuals ingested Omega-3 supplements every day for a month, then there will be no improvement on their memory. Nonetheless, research has proven that there exists a significant relationship between the consumption of Omega-3 and memory efficiency.

The Effects of Temperature on the Rate of Germination and on the Rate of Growth in Bean Sprouts

Adamo Foglietta, My-Linh Ly, Julia Perugini

Teacher: Jeffrey K.L. Eng

The aim of this experiment was to compare the rate of germination and the rate of growth in bean sprouts in different temperatures, i.e. at a cold temperature, at room temperature and in an incubator. The bean sprouts were rinsed daily with the same amount of water for nine days. The rate of germination and the rate of growth were both inhibited in the cold environment, whereas, in the warm environment, the rate of germination was encouraged and the rate of growth was decreased, as compared to the results of the sprouts at room temperature. Thus, temperature does affect the rate of germination and the rate of growth.

Plant Growth vs Fertilizer Type

Katherine Surowaniec, Victoria Lapointe, Alexandre Lépine, Rodrigo Chavez

Teacher: Brian Mader

In our experiment we analyzed two types of fertilizer; organic and non-organic and their effects on the growth of basil plants. Four basil plants had organic fertilizer and four had inorganic fertilizer. Both groups were exposed to the same amount of water and sunlight to have the most amount of controlled variables. The initial hypothesis was that organic fertilizer would cause greater plant growth. After analyzing the data taken every two days for fourteen days there was essentially the same average growth for both groups. Therefore there isn't a significant difference in the growth of plants regardless of the type of fertilizer.

The Effect of Pesticides on Surrounding Soil and Plants

Katia Forgues, Maya Lach-Aidelbaum, Sofia Mucci, Laurianne Debanné

Teacher: Brian Mader

The Ash Tree Borer is an insect responsible for killing up to 200 000 ash tree in Montreal causing the city to spend a million dollars to cut the infected trees or treat them with pesticides. We decided to do experiments to see if the pesticide used to treat ash trees would be found in the soil around the given trees. Consequently, we want to know if this pesticide can be found in the surrounding plants growing in this soil and will be ingested by other animals. To do these experiments, we made two sample of soil one containing leaves of an untreated plant, and another containing leaves from a treated plant, which would contain the pesticide and do qualitative tests. We planted twelve radish seeds in each type of soil. The plants grown in the contaminated soil had an average height of 12.8cm, while the plants grown in uncontaminated soil had an average height of 11.3cm. An error bar analysis showed that there was no significant difference between the two samples. We then did nitrogen and phosphorous tests. To do these tests, we made four different solutions: one being water and cut up leaves and stems from the plants from contaminated soil, another stems and leaves from un-contaminated soil, another being water mixed with contaminated soil, and the other uncontaminated soil. We found that the differences of concentration of both these elements were only slightly increased in the contaminated soil stems and leaves solutions – less than 0.10 mg/L - than in the uncontaminated soil which is not significant. There was no difference in the concentration of nitrogen in both soil solutions, but the difference between the phosphorous concentrations in the contaminated soil solutions was much superior – 0.80 mg/L - to the uncontaminated soil solution. And so, we can say that the pesticide would be found in the soil around the treated tree, but we cannot confirm that the pesticide is found in the plants surrounding the treated trees given the fact the difference in the results was minimal; more tests would be necessary to find this out, and therefore be able to determine if there is a risk for consumers by ingesting the pesticide.

Influence of Water pH on the Hatching and Lifespan of Triop Longicaudatus

Lyubava Erko, Éloïse Methot-Boudreau, Sydney-H Savard

Teacher: Brian Mader

When power plants use oil or coal to produce energy, nitrogen oxide and sulfur dioxide are released into the air, creating acid rains. During rainfall, the acidic water solution mixes with the water in lakes and rivers, which can result in a higher acid concentration in bodies of water housing aquatic organisms. The growth of these organisms, such as triops, is believed to be affected by the pH of the water in which they live. The hatching and lifespan of three experimental (pH 5) and three control (pH 7) groups of Triop Longicaudatus were observed. Error Bar analysis showed that there was a significant difference in lifespan of the triops in the experimental group, which lived a shorter amount of time (mean=2.7333 days) than the individuals in the control group (mean=6.0333 days). Although triops in the water pH of five seemed to hatch more slowly, there was no significant difference in the hatching of the experimental (mean=3.333) and control (mean=6.333) groups. That being the case, hatching was not affected by the pH of the environment, while lifespan in triops living in more acidic water was shorter than that living in neutral pH water. This outcome supports that the diversity of ecosystems can be affected by a changing environment caused by human activities.

The Monarch Butterfly: Growth in Respect to Food Source

Dominique Derome, Emma Touchie, Jake Pambrun, Jennifer Ghetler

Teacher: Brian Mader

Over the years, there has been a decrease in monarch butterfly population initiating captive rearing programs to study and stabilize natural monarch populations. We designed an experiment to test the effects of two different food sources on the growth of monarch caterpillars. One group was given some tropical milkweed before their food source was switched to local wild milkweed that was of poor to moderate condition. The other group was given lab grown tropical milkweed that was of good condition during all of their development before entering the pupal stage. The caterpillars eating wild milkweed had an average growth rate of 0.19 cm per day (n= 4) and the caterpillars eating tropical milkweed had an average growth rate of 0.33 cm per day (n=4). Using error bar analysis, it was demonstrated that there was no significant difference between the two groups of monarch caterpillars. This concludes that different food sources, being local or tropical milkweed, do not have a significant effect on the growth rate of the monarch caterpillars, and rearing programs should use the most attainable food source.

The Effect of Cricket Flour on Calorie Value

Connor Doke, Sophia Harman-Heath, Veronica Groves

Teacher: Brian Mader

With today's growing world population, it is becoming increasingly important to find renewable and sustainable sources and methods of producing our food. In this study, we compared the amount of calories per gram obtained from muffins made with cricket flour and regular flour (n=3). It was observed that there was a greater amount of Cal/gram (or Kcal/gram) for the cricket flour muffins than the regular muffins with mean Kcal/g of 0.063 Kcal/g and 0.045Kcal/g respectively. Using error bar analysis, it was found that the gap was -0.043 indicating that the groups were not significantly different. Since both muffins showed similar calorie count, using cricket flour may be an alternate source of energy and protein nutrients to traditional flour. This has important consequences since 18% of greenhouse gas emissions are a result of livestock and yet approximately one billion people go hungry as a consequence of lack of food.

No Rain, All Gain

Rebecca Amar, Isaac Basal, Michaela Elhadad, Olivia Hecht, Jennifer Titleman

Teacher: Brian Mader

Acid rain has become a growing concern in our present biosphere, due to chemical reactions caused by substances like sulfur dioxide and nitrogen oxides. This acidic pollutant can have disastrous effects on entire ecosystems, including lakes, wetlands, and other aquatic environments, as well as a serious effect on forests. An experiment consisting of a control group (n=4) watered with tap water and an experimental group watered with an acidic solution was performed, in order to determine the impact acid rain can have on pea plant germination, by measuring height. After thorough observation, the control plants germinated faster and more often (mean=13.48) in comparison to the experimental plants (mean=7.5). Error bar analysis demonstrated a significant difference between groups. Therefore, our hypothesis stating that pea plant germination will be affected by acid rain is supported. This indicates a need to cutback on industrial pollution in order to minimize ecological effects.

The 'Best'icide

Julia Daley, Allison Lalla, Sarah Milton, Aniela Walewicz, Lily Carson

Teacher: Brian Mader

The use of chemical pesticides to protect our food crops is becoming increasingly criticized and the shift towards organic farming practices is encouraged. In this study, the effectiveness of an organic pesticide, diatomaceous earth, was tested on bok choy in the Dawson gardens, that was being eaten by flea beetles. It was hypothesized that by adding this insecticide we would observe an increase in the quality of the plant. The number of holes and number of leaves were studied on 10 control plants as well as 10 plants on which 1 teaspoon of diatomaceous earth was added to the surrounding dirt. It was found that the experimental plants had a mean decrease of 6.5 holes and a mean decrease of 0.75 leaves, while the control plants had a mean increase of 9.25 holes and a mean decrease of 3 leaves. Through error bar analysis, there was a significant difference in the average quality of the control plants vs the experimental plants. It can therefore be stated that the diatomaceous earth had an overall positive effect on the overall quality of the bok choy.

The Effect of the Presence of Oil on the Growth of a Radish Seedlings

Carly Bennett, Chloe Jonas, Matthew Regan, Miranda Zolla, Sara Velardo, Mathieu-Justin Pausé-Carbonneau

Teacher: Brian Mader

Oil contamination of soil is an ongoing problem that has many negative effects on the surrounding environment of the contaminated site. Of two groups of seeds that received the same amount of water and light daily, one group received $\frac{1}{4}$ of a tablespoon of Chainsaw Bar oil in order to contaminate it. While measuring the growth of the plants in the control group (n=11) and the plants in the experimental group (n=12), it was observed that oil-contaminated soil stunted the growth of the radish seedlings. The mean shoot system length of the plant in the oil-contaminated group (5.16 cm) was determined, through an error bar analysis, to be significantly lower than that of the control group (11.72 cm). The results obtained offer support to the conclusion that the growth of a plant is negatively impacted when germinated in soil that is contaminated with oil. This evidence can have important implications since the knowledge of the negative effects that oil contamination has on plant growth can serve as an incentive to encourage the decontamination and protection of soil.

Strength of Short Term Auditory vs Visual Memory

John Tsatas, Phil Couto, Steven Philippos, Evan Jakab

Teacher: Brid Nic Niocaill

It is a well-accepted fact among those who study the brain that visual memory is superior to auditory memory. We wanted to test how significant this difference between the two forms of memory was, in terms of short-term memory, as well as how giving the test subjects more to remember affected this difference. We hypothesized that visual memory would yield better results than auditory memory, and amplifying the level of difficulty would amplify the difference between the two. To do this, we tested subjects four times; reading them a first list of 16 words, then a second list of 16 words, and giving them a list of all 32 words and asking them which they had heard on the first list. We did this again with lists of 32 words, and then the same two tests with pictures rather than words. Our results showed that there was a significant difference between auditory and visual memory, with increases of 33% from remembering 16 words to remembering 16 images, and an increase of 66% from 32 words to 32 images. This gave us t-values of 3.6976 and 5.4633 respectively, with a critical t-value of 1.72913; these statistics indicate that the means are significantly different since they are higher than the critical t-value, which supports our hypothesis.

Bacterial Growth And Home Preservation

Mike Calixte, Adam Toledano, Danny Nguyen, Jessica Poirier, Tyler Gilbert

Teacher: Brid Nic Niocaill

This experiment consisted of us testing for bacterial growth in different conditions. We focused mainly on different levels of acidity in which the bacteria would grow. The different levels of growth in these different conditions would reveal similar ideal conditions that would optimize home preservation. These bacteria were taken and smeared onto different agar plates (4 of each) that were prepared with four different pH levels. After three days, bacterial growth was observed on each plate.

We found that despite the differing pH levels, and the generally recommended 4.6 pH level for home preservation of food, bacterial grew on each agar plate. In conclusion, the recommended 4.6 pH level isn't significant enough for ideal home preservation.

Stroop Test

Megi Rembeci, Miguel Rodriguez, Jeremiah Wreh, Cailey Petrenko

Teacher: Brid Nic Niocaill

The 'Stroop effect', a manifestation of interference in the reaction time of a task, was investigated. The purpose of the experiment was to observe whether females experienced greater interference in reaction time than males in the completion of a specific task. We hypothesized that girls would spend more time on the task than boys. To determine if the hypothesis was correct, males and females aged 18-25 were each presented in sequence with four sets of 20 coloured words. The control set (1) consisted of words printed in the same colour as denoted by the word (e.g., the word "red" printed in red ink). The following 3 sets (trials) consisted of words printed in a colour not denoted by the word (e.g., the word "red" printed in blue ink). For each trial, the participants were asked to name the colour of the ink that each word was printed in. This experiment allowed us to observe which sex would be more prone to errors, thus spending more time to complete the task. The data was shown to be significant by statistical analysis. It was observed that males were 10.37% faster than females in naming the ink colour when it was not denoted by the word. The results confirmed the hypothesis that the "Stroop Effect" is less prominent in males than in females.

Effects of Exams on Blood Pressure

Emily Bonomo, Adamo Bernola, Chelsea Varano, Javier Amoretti-Petrelli

Teacher: Brid Nic Niocaill

High blood pressure is a sign of stress and anxiety. Our experiment was conducted in order to demonstrate the effect of stress on blood pressure in Quebec CEGEP students and subsequently drawing correlations between their lifestyle choices and their blood pressures before and after academic examinations. In going about this experiment, a test group of 32 students was examined: each individual's diastolic and systolic blood pressures were taken before and after an exam. After they completed the exam, they were also handed a survey regarding their lifestyle choices and asked to complete it. Our hypothesis in this experiment was that students' will show a decrease in blood pressure when it is measured before and after the exam. After results were compiled, our hypothesis was accepted in that there was a significant decrease in the students' blood pressures after having completed their exam.

Urban Growing of Tomato Plants

Anthony Licursi, John-Nicholas Cheng-Tarantino, Mitchell Teitelbaum, Ryan Dupuis

Teacher: Brid Nic Niocaill

This experiment was conducted in order to see if there was a difference in the overall growth, success and yield of plants with respect to the area that the plants were grown in and their access to sunlight. In this experiment, tomato plants were used to represent all types of plants. Since urban gardening is becoming more and more popular, the question of where to grow the plants in order for them to grow to their full potential in an urban environment often arises among urban gardeners. This experiment was conducted with the aim to give them a concrete answer. It was hypothesized that the plants on the rooftop would produce more tomatoes with a greater overall mass of the tomatoes combined than the plants on the ground because the plants on the rooftop had more access to sunlight. The hypothesis was tested by placing three tomato plants in self-watering containers on the rooftop and three tomato plants in self-watering containers on the ground. This was conducted over the summer of 2015 from May to August. The final results did support the hypothesis. More tomatoes were produced from the plants on the rooftop (46) than from the plants of the ground (29) and the combined mass of the tomatoes from the plants on the rooftop (1.650 kg) was greater than the combined mass of the tomatoes from the plants on the ground (1.290 kg).

Root growth of Saintpaulias treated with honey serum

Margaret Bruna, Nicholas Connors, Sandrine Masella, Laura Wheatley

Teacher: Brid Nic Niocaill

This experiment involved treating the roots of Saintpaulias, more commonly known as African violets, with a homemade honey serum. We hypothesized that if the roots were treated with honey, there would be a noticeable difference in growth compared to those that weren't modified. We predicted that the African violets treated with honey would experience more root growth than our control group. To perform this experiment we compared 4 African violets treated with honey with 4 other African violets that were not treated. We then monitored root growth over a two-week period while the plants were cared for under uniform conditions. The roots that were treated with honey did in fact grow more than those in the control group. This demonstrates that honey can promote root growth in Saintpaulias, which was supported by academics. Our results could have been more accurate if we would have tested more African violets in the control and experimental group. Also, a longer growing time could have given more precise results.

It's All In Your Head

Mor Argaman, Samantha Castelli, Jeffery Hoather, Mikaela Wasserman

Teacher: Brid Nic Niocaill

A placebo is an inactive substance that is used in place of a drug or treatment in an experiment, allowing for an accurate control group. Like any control group, the placebo is used as a method of comparison between patients of a clinical trial. Patients receiving a placebo are unaware that they are not receiving the drug, but still experience an alteration in symptomatic behaviour. This is the Placebo Effect and is used to test the true effectiveness of the experimental drug. Patients expecting to experience certain symptoms or relief of symptoms tend to believe that they are in fact occurring. Because of this fact, the placebo affect is a theory of the effectiveness of perception.

The purpose of this experiment is to test the relativity of the placebo effect through the expected effects of caffeine. Two groups of patients participated in the experiment. All were given the same sugar pill with the same dose and same physical appearance. One group was told the truth: they were ingesting the sugar pill, whereas the second group was told that they were ingesting a pill of concentrated caffeine. Caffeine works by stimulating the central nervous system, heart, muscles and the blood pressure of the human body. Its effects are numerous and serve as the basis for testing the relativity of a placebo in an experiment. Neither group was actually receiving any caffeine; however, the expectation of certain symptoms of caffeine was enough to distinguish a correlation between the conscious anticipations of the patients and their physical changes. It is most likely that the results demonstrate a significant difference between the subjects where the placebo effect was applied and the control group.

The effect of dust and other toxic particles on trees

Rita Abdul-Malak, Simon Perez, Hye Ji Hwang, Mohadeseh Azimi

Teacher: Brid Nic Niocaill

This research concerning the atmospheric pollution is focused on its effects on one of the primary producers of the Earth's ecosystem. Their number is decreasing every year as their task of "cleaning" the air accumulates. In the city, however, the greens are exposed to excessive amount of pollutant factors. Then, which area of Montreal is more polluted? Our hypothesis is that Downtown part will be the area the most polluted, based on the mass of the dust collected from the tree's leaves. To study Montreal's pollution as whole, the island was divided in four sections: Downtown, East (Pointe-aux-Trembles), West (Benny Park near Sherbrooke St.) and Mont Royal, representatively. Two sets of samples are collected to be studied, from three selected trees from each section. This part of the research was studied with Chi-squared Test (χ^2 Test). According to the data, we saw that the all the data are more or less close to each other, because the areas where all the samples were collected were relatively close to each other; which was in Montreal. Although this is true, there was still some differences to the mass of the dust for four areas due to the fact that some areas are more polluted than others. However, the analysis of the results show that our hypothesis was not supported. The experimental data showed that the most polluted area in Montreal was found to be the East at Pointe-aux-Trembles, (not Downtown) where there was presence of an oil facility (Suncor Industry), showing a significantly bigger amount of dust on the leaves. Dust may affect the maple tree's photosynthesis and respiration by shading effect and blockage of stomata respectively. Also plant can suffer from toxic pollutants small enough to penetrate into its system. This leads to drastic environmental problems such as lack of oxygen in the atmosphere, thus propagating disease. However, there were very few studies on the relationship between plants and atmospheric pollution to conclude if such amount of dust on trees were dangerous and effective enough to threaten Montreal's trees. Recommendations to make further research on pollution and dust levels and its effects to Montreal's maple trees are made, in order to find a solutions to protect plants that are sensitive to atmospheric pollution.

Atmospheric pollution in Montreal, studied by the amount of dust on tree leaves

Esther Hye Ji Hwang, Mohadeseh Azimi, Rita Abdul-Malak, Simon Perez

Teacher: Brid Nic Niocaill

This research concerning the atmospheric pollution is focused on its effects on one of the primary producers of the Earth's ecosystem. Their number is decreasing every year as their task of "cleaning" the air accumulates. In the city, however, the greens are exposed to excessive amount of pollutant factors. Then, which area of Montreal is more polluted? To study Montreal's pollution as whole, the island was divided in four sections: Downtown, East (Pointe-aux-Trembles), West (Benny Park near Sherbrooke St.) and Mont Royal, representatively. This part of the research was studied with Chi-squared Test (X² Test). According to the data, we saw that there were differences to the mass of the dust for four areas due to the fact that some areas are more polluted than others. However, The experimental data showed that the most polluted area in Montreal was found to be the East at Pointe-aux-Trembles, (not Downtown) where there was presence of an oil facility (Suncor Industry), showing a significantly bigger amount of dust on the leaves. Dust may affect the maple tree's photosynthesis and respiration by shading effect and blockage of stomata respectively. Also plant can suffer from toxic pollutants small enough to penetrate into its system. This leads to drastic environmental problems such as lack of oxygen in the atmosphere, thus propagating disease. However, there were very few studies on the relationship between plants and atmospheric pollution to conclude if such amount of dust on trees were dangerous and effective enough to threaten Montreal's trees. Recommendations to make further research on pollution and dust levels and its effects to Montreal's maple trees are made, in order to find a solutions to protect plants that are sensitive to atmospheric pollution.

The effect of spices on bacterial growth

Hind Benkerroum, Kajal Patel, Maria Makridis, Zahra Turki

Teacher: Brid Nic Niocaill

The antimicrobial effect of three spices used in human nutrition (cinnamon, pepper, and clove) in addition to garlic was tested against a microbial suspension obtained from garden soil. The antimicrobial activity was tested on an agar plate seeded with a lawn of an overnight microbial culture of soil suspension in water plus sugar (10%). For spices the test was performed with the disk method classically used in antibiogram while garlic was crashed in a mortar and used as a spot onto the seeded agar plate. To prepare spice extracts, each spice was soaked in cold for 24h or boiling water for 5 min, respectively. A large spectrum antibiotic was used in the same conditions as spices to serve as a positive control. Inoculated plates were allowed to incubate at room temperature (about 20°C) for 24 hours, then checked regularly for the next seven days for possible growth or inhibition of molds.

The results obtained showed that garlic was the most inhibitory to soil microorganisms including molds as suggested by the observation that the inhibition zone around the garlic spot no mold growth was observed after 7 days of incubation, whilst intensive growth was observed within the zone of inhibition of the antibiotic after 4 days. Cinnamon also inhibited soil microorganisms, but to a lesser extent than garlic (smaller diameters of the inhibition zones). No inhibition was observed with spices or garlic extracted in boiling water, suggesting that the heat treatment applied destroys the active principles.

The Effect of Heat as an Abiotic Stressor on the Inter-Organismic Communication of Bean Plants (*Phaseolus vulgaris*)

Cameron Lennox, Alexander Torabi, Krissy Kontos, Stefan Varnev

Teacher: Brid Nic Nicolail

When exposed to a heat stressor, the *Phaseolus vulgaris* releases chemical signals to plants in its proximity. The communication is by way of the same chemical compounds as those released by many plants, designed as an evolutionary survival mechanism in order to protect themselves from harmful biotic and abiotic factors. The main purpose of this experiment is to determine if bean plants' communication is as effective underground, through their network of roots, as the communication as a result of volatile chemical compounds. We expect that a separation in the soil between two plants would decrease their inter-organismic communication, consequently decreasing their growth and development. In order to test this hypothesis, four plants are examined: two as a control group (sharing a pot), and two (sharing a pot) with a separation in the soil as the experimental group. Both groups were subjected to a heat stressor, according to a specific schedule, allowing for the second plant of each group to receive signals from the first plant before it was heated. Both stem length and leaf surface area were studied to determine the extent of which the heat stressor had affected each plant. After heating, the stem length in the control groups was higher than in our experimental, by an average ratio of 5.25/2.25 cm and the surface area was larger in the control group than in the experimental with a comparative ratio of 9.6 cm² to 4.175 cm². Statistical analysis for both variables showed our results were statistically significant, resulting in T-values of 2.3829 and 2.8709, both of which are larger than the corresponding critical value (2.353). The experiment therefore produced results supporting our hypothesis, which was that the placement of a barrier in the soil between plants would negatively affect the inter-organism communications and result in more vulnerable plants.

The Effect of Acid Stress on the Heart Rate of *Daphnia magna*

Amro Abdrabo, Olivier Taylor Malouf, Claudia Bielecki, Yasmine Abdrabo

Teacher: Caroline Robert

Acidification of freshwater lakes has increased due to anthropogenic causes like acid mine drainage and others. (Mehta, P., 2010). In the past years, the effects of acidification on fish was studied extensively and an increased mortality was associated with increase in acidity of the water. However, effects of acidity on physiology functions and hence survival was less known for daphnids. (Pirow, R; Anna K. Weber, 2009).

The sensitivity of aquatic crustaceans to slight disturbances in acid stress is determined by ion regulation and osmoregulatory processes. (Pirow, R; Anna K. Weber, 2009). *D. magna*, when exposed to severe acid stress, showed a net efflux of sodium ions and a disruption of the aforementioned processes. (Pirow, R; Anna K. Weber, 2009). In consequence, daphnids try to maintain homeostasis by increasing the rate of sodium uptake, a response reasonably assumed to be accomplishable only by increasing the circulation rate of hemolymph. As the circulation rate increases then a concomitant increase in heart rate is predictable, thus the hypothesis: *D. magna* left to acclimatize to acidic environments demonstrate higher heart rates than the control group, which thrived in circumneutral conditions. The control and experimental groups were comprised each of ten *D. magna*. The t-test was applied to determine if there was a significant difference between the average heart rate of the control and that of the experimental group. Results confirmed a significant difference. The mean heart rate of the experimental group was 270 beats per minute; whereas for the control group it was 225 beats per minute. The average represents the number of heart beats expected for each group. The non-overlapping intervals of the means revealed a significant difference. *D. magna* respond to increased acidity in their environment by increasing their heart rate.

The Effects of Glucose and Maltose on the Fermentation of Yeast

Anh Ho, Timothy Woo, Anthony Laye

Teacher: Caroline Robert

During fermentation, *Saccharomyces Cerevisiae* produces carbon dioxide. When a carbohydrate is added to yeast during fermentation it increases the production of carbon dioxide. The purpose of this experiment was to test the effects of glucose and maltose on the production of carbon dioxide by *Saccharomyces Cerevisiae*. The hypothesis was that the *Saccharomyces Cerevisiae* mixed with maltose would produce less carbon dioxide than *Saccharomyces Cerevisiae* mixed with glucose because *Saccharomyces Cerevisiae* has very low quantities of maltase, the enzyme needed to break the bonds between the glucose. The experiment had 5 control groups and 5 experimental groups. The experiment was done by adding 25 mL of yeast and 10 mL of either glucose or maltose to a 125mL Erlenmeyer flask and stirring. This experiment allowed us to observe how yeast metabolizes different carbohydrates. The results allowed us to determine whether glucose had a greater effect on the production of carbon dioxide by yeast than maltose. The production of carbon dioxide was recorded once every second for 5 minutes and the rate of carbon dioxide was calculated. The mean value of the rate of the glucose solution was 1.06 Atm*min/g yeast and the mean value of the rate of the maltose solution was 0.663 Atm*min/g yeast. A one tailed t-test was done comparing the experimental and the control group showed that there was a significant difference between the two groups. Therefore, the yeast mixed with the maltose had a significantly lower production of carbon dioxide than the glucose.

Junk food and healthy food offered to college students, which will they choose?

Jeff Clarence Cabanilla, Michael Gimple, Jacob Hui, Petia Pavlova

Teacher: Caroline Robert

With the popularity of Tim Horton's at school, one must wonder what type of food do people prefer when they are offered a choice between an apple and a timbit? The hypothesis is that individuals prefer junk food because it can be bought almost anywhere which indicates that there is a lot of demand. Studies in the past have shown that giving a health prime, such as a healthy recipe, to overweight people influenced their shopping basket. It had no effect on people with a healthy weight (Papies et al., 2014). Moreover, Rocio Sanchez-Garcia asked 1465 students in Mexican schools to rank their 70 favorite foods for his research (Sanchez Garcia, Reyes-Morales & Gonzalez-Unzaga, 2014). The top picks were mostly unhealthy foods with high levels of fats or sugars, such as pizza and fries. The most disliked foods were vegetables and other foods which are considered as "healthy". Lastly, according to a survey done on Italian university students by Adele Anna Teleman, more than 90% of the students do not have the recommended number of meals per day and a third do not eat breakfast regularly (Teleman et al., 2015). In the experiment, out of 64 people that have answered the provided questionnaire, 31 chose the unhealthy choice, a timbit, 32 chose the healthy choice, which was an apple and one person did not pick. To conclude, by use of the Chi-square test it was determined that there is not a significant difference in preference between healthy and junk food for students with an education at the college level.

Pupil Contraction Time of Blue Eyes Versus Brown Eyes in Humans

Julia Escobar, Erin Eves, Véronique Lafrance, Victoria Tawa

Teacher: Caroline Robert

When exposed to bright lights, the pupils in the eyes shrink to prevent too much light from entering the eye. People who have less pigment in their eyes are more photosensitive, because they lack melanin in their irises which renders the iris unable to absorb intense and bright lights so that the light is not as intense or bright when focusing on the retina. This would also suggest that their pupils contract at a faster rate. The hypothesis was that blue eyes are more photosensitive and that the pupils of the subjects with blue irises would take less time to fully contract than the pupils of the subjects with brown irises. Twenty subjects with blue eyes, and twenty subjects with brown eyes had their eyes filmed with a slow motion camera while being exposed to a bright light produced by a flashlight in a dimly lit area and the time it took for the pupil to fully contract was measured. The average time for the pupil to contract in blue eyes was 1.067 seconds whereas the mean value for brown eyes was 1.444 seconds. These results were compared with the T-test and it was found that there was indeed a significant difference between the time it takes for the pupils of blue eyes to contract than the time it takes for the pupils of brown eyes to contract, that significant difference being that the blue eyes reacted faster thereby confirming the hypothesis.

Fish and their effect on aquatic plant growth

Christos Alexopoulos, Elinor Bitton, Armando Ienaro, Shaan Popowich

Teacher: Caroline Robert

The goal of this experiment was to examine if the presence of fish had an effect on aquatic plant growth. It can be hypothesized that in such an experiment, the aquatic plants will grow taller in the presence of fish, due to various studies showing how various fish activities, such as nitrate production in the form of feces, aid in aquatic plant growth. More specifically, the experiment included a comparison of two sets of 3 plants (one control and one experimental) in which the control group had no fish in the water tank, while the experimental group had 4 comet goldfish in the water tank. Over the course of 3 weeks, the height of the plants was measured. At the end of the 3 weeks, the control group grew to an average height of 6.17 cm, and the experimental group grew to an average height of 7.33 cm. Using the T-test indicated that the difference in height between these two groups is not considered to be statistically significant. However, further studies should be performed with a larger sample size in order to get a more accurate conclusion.

The Effect of Sleep Duration on Short Term Memory

Amanda Hughes, Iliana Katinakis, Lennart Lemaire, Juliana Linares

Teacher: Caroline Robert

This experiment's goal was to study the effect of sleep duration on short term memory of young adults, aged from 17 to 21 years old. The hypothesis states that there is a positive correlation between sleep duration and short term memory. To verify this statement, 20 subjects were tested when they slept less than 6 hours and when they slept more than 6 hours. The control group consisted of the well-rested subjects, while the experimental group included the sleep deprived subjects. Short term memory was evaluated using a series of 12 words. The subject was asked to remember as many as he could in the space of 30 seconds. The results show that sleep-deprived subjects remembered on average 6.7 words, while well-rested subjects remembered on average 8.1 words. Using the T-test with a confidence interval of 95%, the results prove that there is a significant difference between the experimental and the control group. Therefore sleep duration does have an impact on young adult's short term memory.

The Effect of Violence on Blood Pressure

Christopher Lariccia, Alexander Di Giacomo, Jack-Stefan Edimo Penda, Jeffrey Lehberg

Teacher: Caroline Robert

The goal of this experiment was to observe the change in blood pressure in someone playing a violent video game, involving killing or maiming an image of a human body, compared to the change in blood pressure from playing video games not involving these violent aspects. The hypothesis studied was that the excessive violence and willingness to kill associated with most online multiplayer first-person shooter games would raise the blood pressure of our test subjects significantly when compared to their change in blood pressure when they played a nonviolent game. A group of twenty 17-19 year old males were tested by taking their resting blood pressure and comparing them to their blood pressure after playing the two different video games for 5 minutes. After taking the mean of the systolic and diastolic blood pressures for both before and after, for both video games, the results showed an increase of 4.45 for the violent systolic blood pressure, an increase of 1.1 for the violent diastolic blood pressure, a decrease of 3.05 for the nonviolent systolic blood pressure, and a decrease of 0.3 for the diastolic blood pressure. These results disagree with the hypothesis, and state that blood pressure is not dependent on violence, it is rather dependent on the amount of stress someone experiences and the level of difficulty they deem the task to have.

The Effect of Music on Short Term Memory

Axel Bogos, Ekin Ozdemir, Lucas Thow, Nicole Kitner

Teacher: Caroline Robert

Music and memory stimulate the same parts of the brain, which may be evidence of a strong correlation between the exposure to music and the increase of memory. There have been studies that have suggested that classical music has a positive impact on the memory of individuals (Konontz, 2012). This experiment focuses on the relationship between one's exposure to classical music and their ability to recall information. The hypothesis of the experiment is that if an individual is exposed to classical music during the encryption of information, then their recalling of the information will be more accurate than those who are not exposed to classical music. 30 people were tested at two different times, one time without being exposed to music and the other with classical music exposure. They were asked to memorize a list of 15 words over the period of 1 minute, and were then required to rewrite as many words they could remember within a period of 1 minute and 20 seconds. The average number of words recalled while listening to classical music was 10.6, and the average number of words recalled while not exposed was 9.4 words. After analyzing the results using the T-test, it was concluded that there was not a significant difference between the results of both groups, as the confidence intervals overlapped. Due to these results, the hypothesis was rejected and it can be concluded that there is not a significant impact from classical music on memory.

The effect of a music's BPM on a person's ability to memorize words list

Ana Popa, Jeremy Epstein, Mahmud Miah

Teacher: Caroline Robert

The goal of this experiment is to investigate whether a music's beats per minute has an effect on a person's ability to memorize word lists. The two songs that were selected in order to carry out this experiment were "Lucky" by Jason Mraz and "Do me a favour" by the Arctic Monkeys which each respectfully have an average BPM of 66 and 182. The research hypothesis was that the higher the BPM, the more it would impair a person's ability to memorize words list. For this experiment, 30 participants randomly selected were given two different words list. They had one minute to study each list while the music was playing, one minute to sit in silence and one minute to recall as many words as possible and write them down. The order in which the words were written down did not affect their score. The average number of words remembered by a participant listening to low bpm music was 8.93 and 8.30 for the high bpm music. After analysing these scores using the T-test, no significant difference was observed between the two groups. In conclusion, since there is an overlap in the confidence interval, there is no significant difference between the two groups and therefore cannot tell whether a music's BPM impacts a person's ability to memorize words list.

The Effect of Chewing Gum on the memory of 20 Students When Asked to Recall Digits

Emilie Garon, Lisa Giaccari, Silvana Amato-Denis, Jessica Castillo

Teacher: Caroline Robert

Although memory and learning are very closely related, the former is an idea or experience caused by a behavioural change, whereas the latter is the action of processing information and storing it (Okano,H. et al.,2000). Learning and recalling information are often tied with respect to the act of association ("Associative Memory," 2007). The associative memory pairs a repetitive or continuous stimulus to an object or idea that was exposed during the experience ("Associative Memory," 2007). An example of associative memory is the effect that chewing gum has on memory. When one chews gum, the behavioural change of mastication occurs and acts as a stimulus. If gum is chewed while taking in information, then the chances of that information being remembered are increased. An experiment was conducted that tested the effect chewing gum had on the memory of 10 males and 10 females. Five people from each gender were initially tested to recall seven digits without gum and then with gum. The reverse order of the procedure was used for the other 10 people. The mean number of digits recalled with gum was 5.45 and without gum was 4.55. Upon analysis using a t-test, there was no significant difference between the effect of chewing gum and not chewing gum on memory.

The Effects of Familiarity on the Task of Proofreading

Krishna Patel, Christina Aladas, Janet Yang, Tyler Dubois

Teacher: Caroline Robert

Proofreading is a demanding task that requires the human brain to process words and sentences to decipher their grammatical fidelity. In the present experiment, familiarity regarding word or sentence structures is examined to determine whether or not it upsets this task. The hypothesis was that a person's ability to identify mistakes will be hindered by the familiar contents of a text. The experiment was conducted on 50 Dawson College students. The first 25 students had the task of reading an error-filled text, followed by a corrected version of the same text. The other 25 students read a correct version of that same text first, and then proceeded to read the error-filled version. In both groups, the subjects' oral recitals were recorded for any mistakes they identified. In accordance with the hypothesis, there was a significant difference between the two groups when the subjects first read the correct version of the text. Subjects were more likely to overlook mistakes if they were familiar with the text. The results supported the hypothesis, in that a person's ability to discriminate mistakes is hindered by the familiar contents of a text.

Cognitive Skills and Handedness

Ryu Lemay, Matthew Liu

Teacher: Annie-Hélène Samson

While it is accepted that handedness in humans is caused by genetics and the organisation of the right and left hemispheres of the brain, it is unclear whether or not it affects cognitive skills such as selective attention. We wanted to test if there was in fact a link by using the Stroop test which tests for certain cognitive skills as well as reaction time and automaticity of the brain. In our experiment we used the Stroop test to test 87 individuals (aged 17-20 years old) of which 23 were right handed males, 20 were left handed males, 24 were right handed females and 20 were left handed females. Statistical analysis have shown no difference between the groups, suggesting that handedness (or gender) is not a factor in reaction time for young humans.

Effect of Light on Ripening of Bananas

Sam Fisher, Devin Kreuzer

Teacher: Annie-Hélène Samson

The goal of this experiment was to determine whether light had an effect on the rate at which bananas ripen, according to their colour development. Based on gathered knowledge from previous studies, our hypothesis is that there will be a difference in the rates of colour change between bananas exposed to light and darkness. In order to do so, we placed bananas in transparent plastic wrappings in a transparent box and under a light and a same number of bananas wrapped in the same manner in an opaque plastic box. The goal in doing this was to maintain constant temperatures, and atmospheric conditions for both groups. We took notes on the state of each banana's colour each day and graded them according to our scale.

We did not find a significant difference in the rate of colour development in each group of bananas. However, we did observe interesting differences in what started growing on the bananas at advanced stages of ripeness. Most notably, there was a difference in the colour of what appeared to be fungus in both groups. Though this does not change the fact that we must accept the null hypothesis, it is an interesting topic for future study.

The main implications of this study would be for owners of fruit markets. Specifically whether they should store their bananas under light or in the dark in order to maximize shelf-life.

Influence of a High Sugar Diet on the Weight of Laboratory Mice (*mus musculus*)

Fanny Balestrat, Jennifer Suliteanu

Teacher: Annie-Hélène Samson

The experiment will study the effect of a high sugar diet on laboratory mice, *mus musculus*. Two groups of mice were fed equally caloric cereal diets, one low sugar and one high sugar. The mice were weighed every day for 10 days. The results of the experiment showed that the average weight gain of the mice given sugary cereals from day 1 to day 10 was significantly larger than the average weight gain of the low sugar group (4.2g > 1.25g). The experiment supported the hypothesis that a high sugar diet has a major impact on weight gain, and that the quantity of calories consumed is not the only factor affecting weight gain. This might be explained by the 2006 study that found data that supported a link between sugar consumption and an increase in body mass index (Ebbeling, 2006).

Effect of Different genres of music on Plant Height

Maude Bédard, Zachary Berkson Korenberg

Teacher: Annie-Hélène Samson

The purpose of this experiment was to determine the effect of different genres of music on plant height. Since research has shown that music can have a positive effect on germination, the initial hypothesis was that both groups of Radish plants exposed to music would grow more than a group not exposed to music. We also hypothesized that the plants exposed to heavy metal music would have an average height higher than the plants exposed to classical music. A total of twenty-four plants were exposed to 3 hours per day of their assigned music genre. The final average height of the group exposed to heavy metal was 579 mm, while the group exposed to classical music was 568 mm; the control group, not exposed to music, was of 535 mm. The data between the control group and each experimental group as well as the data between both experimental groups were found to be statistically significant. This suggests that exposition to music does have a positive effect in plant height and that different genres of music can have stronger effects. We think this is because exposing plants to different frequencies and wavelengths of sound can stimulate cells and tissues and therefore accelerate their growth.

Daphnia on Drugs

Julia Cohen, Leif Truesdale

Teacher: Annie-Hélène Samson

The purpose of this experiment was to understand the effects of sugar and caffeine on heart rate. Caffeine targets the central nervous system while sugar causes the heart rate to increase during digestion when glucose is converted into energy. Daphnia, or water fleas, were used as test subjects. They were put in separate tanks, each containing a solution of either stimulant and their heart rates were observed and measured using a microscope. Statistical analysis showed that there was no significant difference between the heart rates of the daphnia exposed to sugar compared to those exposed to caffeine. Therefore the data suggests that, concerning heart rate, sugar is as stimulating as caffeine.

Growth response of various commercial micro-green plants to the presence of carbonic acid

George Vlad Calapod, Mitchell Keeley

Teacher: Annie-Hélène Samson

The aim of our experiment was to determine how low concentrations of carbonic acid in soil (present due to higher CO₂ levels in the atmosphere) would affect the growth of micro-green plants. To do so we planted and grew various micro-green plants; Mizuna (*Brassica juncea*), Endive (*Cichorium endivia*), and Broccoli (*Brassica oleracea*), which we watered with either carbonated or non-carbonated (tap) water. We then measured their growth by recording the stem length and number of leaves on each plant. Our results are varied; for the Mizuna, we obtained significant differences in both stem length and number of leaves between the carbonic and non-carbonic groups. However, for the Endive and Broccoli, we obtained insignificant differences between the two groups in both respects. Our results suggest that Mizuna's growth is affected by low concentrations of carbonic acid in the soil, and that Endive and Broccoli growth is not. From this we hypothesize that Endive and Broccoli plants possess adaptations which allow them to more effectively resist the effects of carbonic acid in the soil. However, this may only be due to the low concentrations of carbonic acid used in this study. Thus, more research with higher concentrations of carbonic acid and in better controlled experimental conditions is needed to conclusively determine the existence of any such adaptations or lack thereof.

Does the environment contribute to stress?

Jonathan Boretsky, Saverio Vadicchino, Josh Mogil

Teacher: Annie-Hélène Samson

Some people prefer studying in a calm and quiet library while others insist that they can study anywhere, regardless of what is happening in the background. Studying for an upcoming test, surely, is stressful in itself, but it is unclear as to whether or not the environment in which a person studies can influence their stress levels as well. We believe that studying in a more stressful environment will cause stress levels to rise more than while studying in a calming environment. In order to determine the effect of a stressful room, two groups were asked to perform the same stressful task of studying for an upcoming memory test, one in a more stress-inducing room than the other. Salivary samples were collected before and after the studying session, and the net change in salivary cortisol concentrations from each sample was measured using a cortisol kit as an indicator of relative changes in stress. The average difference in salivary cortisol concentration before and after studying was +4ng/mL for the stressed group and -13ng/mL for the calm group. This shows that the group in the calm room felt a slight decrease in stress from the beginning to the end of the experiment while the stressed group felt a slight increase in stress between the beginning and the end. However, since the difference in stress was not statistically significant, we cannot reject the null hypothesis, which states that there is no difference in the changes in stress for both groups. We think this might be explained by our fairly low sample size of 8 people per group as well as the possibility that our stressed group was not stressed enough.

Another possible explanation is that the stress caused by participating in an experiment without knowing its premise overshadowed the stress caused by the task itself or by the environment. This stress would dissipate as subjects became familiar with the simple task and would consequentially skew the results.

The Ideal Soil Composition For Beet Seeds Growth

Julien Lies, Giuseppe Lipari, Ayoub Elhanchi

Teacher: Annie-Hélène Samson

The purpose of this experiment is to determine the best composition of soil to optimize beet seed growth. To evaluate the beet growth, we will measure the stem length of the beet seedlings and the number of beet seedlings grown after twenty-one days. In our experiment, we decided to grow beet seeds in five different soils composed of different ratios of organic material/ minerals: (1) 90/10, (2) 70/30, (3) 50/50, (4) 30/70, (5) 10/90; with the 3rd pot as the control group. After twenty-one days, we observed a significant positive growth difference in stem length of the pot composed 70% organic matter and 30% minerals in comparison to the control pot. In addition, there is no significant difference of beet seedlings produced in each pot in comparison to the control groups. Therefore, based on the data, there is a particular soil composition that favours beet seeds growth by providing the beets with their ideal ratio of nutrients and we believe this is due to the fact that beet seeds grow better in a soil rich in organic matter, but at the same time they need a sandy soil with a high phosphorus concentration. From our results, the ideal proportion of these two factors is 70/30.

The Effect of Hydrogen Peroxide on Brassica Oleracea Growth

Natalia Pavlasek, Chelsea Myers-Colet, Nicholas Zaharakis, Iana Chtro

Teacher: Annie-Hélène Samson

The purpose of this study is to determine the effect of different hydrogen peroxide concentrations on the growth of Brassica Oleracea, commonly known as broccoli. This was done by growing seedlings in different concentrations of hydrogen peroxide and measuring their growth over the course of three weeks. It was found that hydrogen peroxide has a significant negative effect on the growth of broccoli at high concentrations and had an insignificant effect at low concentrations. Hydrogen peroxide is an oxidising agent and therefore a carcinogen, meaning it helped the broccoli to grow rapidly at higher concentrations but did not lead to healthy plants, causing the broccoli to die much more quickly.

The Influence of Increased Gravity over Plant Growth

Steven Cangul, Isa Nanic, Dan-Cornelius Savu, Chaitanya Varier

Teacher: Annie-Hélène Samson

With the new exciting discoveries brought back to Mother Earth from Mars regarding the possible presence of alien forms of life, we here at Dawson College wanted to know how plant growth would behave under a gravity of different strength. To simulate a plant growing in an environment with an increased gravity, we built a fairly inexpensive centrifuge in which up to eight radish seeds could be contained. We have found that the roots of the plants in the centrifuge, when compared to the ones kept under earthly gravitational acceleration, were significantly longer, while the stem length was not influenced by a change in gravitational force. We believe this may be because of how a plant's roots shows positive gravitropism (i.e. the roots grow towards gravity), hence roots would grow at a faster rate under a stronger gravity. While our results do seem to suggest that radish roots grow differently under different gravitational forces, we still suggest the attempt of a more refined simulation that would impose an even greater gravity on the plant during a greater period of time to allow us to establish a growth trend.

Onward to ScienceFest 2016!

The December 2015 edition of ScienceFest is designed to not only promote current student work to the college at large, but also to get students further involved in their research by taking it outside the classroom and to a diverse audience. This fosters transparency in research science but also provides an opportunity for students to defend their reasearch and explain it to others in new ways.

There are currently many Independent Research CE projects underway in various disciplines. Some projects are linked to courses, others linked to SPACE (Sciences Participating with Arts & Culture in Education) and still others are completely independent. Many of these projects will be presented during ScienceFest 2016, near the end of the Winter 2016 semester.

The 2016 edition will consist of a series of student presentations, science fair style installations, as well as a poster presentation. Be sure to hold on to your posters from this semester because posters presented here may be presented again in 2016 and entered to win prizes!

