



Science Fest

Learn it. Share it. Celebrate it.

May 8th - 12th, 2017



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Welcome

Welcome to the 3rd annual ScienceFest! You have all worked very hard all semester - planning, discussing, building, planting, observing, growing, tabulating, calculating, writing, and all your hard work has culminated to this point. Congratulations for making it this far.

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 with other members of the Dawson community.

We would like to take this opportunity to thank everyone who has helped put this event together: the students, our sponsors, the support staff members, and the faculty members. This event would not be able to run without the continual efforts of all of you.

Finally, thank you presenters and participants, for taking part in this event. Thank you for sharing your knowledge and passion for science.

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Cover Design is an excerpt from the ScienceFest 2016 poster designed by 3rd year Illustration and Design student Yu Xiang Ren

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Instructions to Participants

Poster Presentations

Your posters can be attached directly to the wall in the 5C East hallway with sticky tack or the special attachments provided by the registration table.

Poster set-up – Monday, May 8th, 9:00am

Poster take-down – Anytime after 4:00pm on Thursday, May 11th

Note: any posters not taken down by May 16th, will be recycled.

For conference awards purposes, the posters will be evaluated by our conference judges. Judges will be looking at presentation as well as content to determine prizes. Although it is not absolutely necessary for candidates to be present while the judging process is occurring, students are encouraged to spend time at their poster and answer any questions observers and judges may have. Awards for posters will be given during the awards banquet on Friday, May 12. Winners for the different categories will be messaged. Please note, your teachers may have additional instructions/assignments linked to the presentation of your poster. Please consult with them for any further evaluations.

Project Displays & Demonstrations

Project Demonstrations will follow the same guidelines as “Oral Presentations”, mentioned below. These Demonstrations will take place in the 2nd floor cafeteria (upper atrium).

Weeklong project displays will follow the same guidelines as “Poster Presentations”, mentioned above.

Oral Presentations

Please consult the conference schedule to see when and where you will be presenting. Please come to your allotted location with your presentation in hand (on a USB or saved online). You will be using a college computer to do your presentation and you will have internet access. If alternate arrangements need to be made, please specify ahead of time. A conference organizer will be in the room to assist you with set-up and the timing of your presentation.

Notes

Project Abstracts – Poster Presentations

Biology NYA CE Projects

The different activity level of *Artemia Franciscana* in warm and cold water

Shanni Li, Jayna Patel, Imene Turki, Jenny Trinh

The purpose of this experiment was to determine the activity level of the Brine Shrimp, *Artemia Franciscana*, in warm and cold water temperatures. In order to determine that *Artemia Franciscana* exhibited a reduced activity level in cold water, compared to warm water, the experiment was conducted in two groups of different water temperatures, 28°C and 15°C. One *Artemia Franciscana* was used per trial and a total number of 25 trials was performed for each group. A sample size of 25 *Artemia Franciscana*, after their incubation, was randomly chosen to test their swimming performance by recording the number of times they swam across the middle line of the container. In the temperature of 28°C, the mean value of the activity level of *Artemia franciscana* was 9.44, whereas the mean value in the temperature of 15°C was decreased to 5.08. The significant difference of the activity level for the two groups was presented by applying a T-test statistical analysis. The result obtained from the analysis indicated a higher activity level of *Artemia Franciscana* in a warmer water temperature than in a lower water temperature.

The Impact of Vitamin C on Plant Growth

Anonna Chowdhury, Irina Mitrea, Yasmin Osman

The presence of vitamin C in plants has been proved to be highly beneficial; with potential to raise the rates of photosynthesis, growth and protection against environmental stress. The purpose of the experiment conducted was to examine and compare the growth and development of a green bean plant when receiving supplementary vitamin C. Observing the seed germination and plant growth was first done for a control group, consisting of a group of individual green bean seeds, receiving pure water. Simultaneously, the experimental group of individual green bean seeds received a solution made of Vitamin C and water. Consistent watering of all seeds lead to no seed germination in the experimental group. However, a few seeds germinated and grew into plants in the control group. These differences seem to support the idea that Vitamin C, in this experiment, may have had detrimental effects on the plants' growth. The excess of ascorbic acid in contact with the green bean plants inhibited the plant's growth and germination.

The Effects of Diesel Fuel on the Survival of *Aegagropila linnaei*

Velka Rosenfeld, Myriam Benlolo, Emma Hooker, Ivona Nacevska

Algae play a critical role in the ocean's ecosystem. The negative effect of oil spills on algae are well known. The purpose of this study was to determine the effects of diesel fuel on the survival of freshwater algae. The initial hypothesis was that, like in the ocean, the algae would die after exposure to the contaminant. Five *Aegagrophila linnaei* were used as a negative control and five were exposed to a water-diesel solution for a period of four weeks. The results of this experiment showed a survival rate of 100%. Several factors may have contributed to the algae's survival, including the type of algae used, the lack of currents and weathering, and the slight difference between crude oil and diesel fuel. This experiment shows the resistant nature of *Aegagrophila linnaei* and its ability to survive fluctuations in its environment.

The Relationship Between Personality Types and Program Choice in College Students

Jenna Di Sciullo, George Yaziji, Akashdeep Singh, Anastasia Boyaram

The goal of this experiment was to discover if a relationship exists between program choice and personality type in CÉGEP students. In order to investigate the relationship, forty students were asked to fill out a questionnaire with 18 questions designed to categorize their personality type. Twenty students were in science and the other twenty were in social science. Chi-square statistics were used to test three different null hypotheses at a significance level of 0.05. The hypotheses were: “There is no relationship between CÉGEP program and the student’s personality type”, “There is no relationship between students in science and their personality type”, and “There is no relationship between students in social science and their personality type”. The first two tests resulted in the null hypothesis being rejected; this meaning that there is a relationship between science and social science programs and their personality types. It was also shown that there is a relationship between science students and their personality type. The null hypothesis for the third test was accepted; leading to the conclusion that there is no relationship between students in social science and their personality type. In order to give the experiment a biological dimension, research was done to understand the relationship between brain structures and personality type. It was revealed that there is indeed a direct link between personality traits and differences in the thickness of the cortex, the degree of cortex folding, as well as the overall volume of the brain.

Relation between Height and Blood Pressure

Doha Zrouki, Sarah Chloé Cuvilly, Juliana Abbatt-Montpetit

The objective of this experiment was to determine whether height affects blood pressure (BP). We collected data (systolic and diastolic BP, height and sex) from 73 Dawson students from 16 to 22 years old. We then analysed two variables: systolic and diastolic BP, to correlate with height. The results showed that more individuals with a normal systolic BP were under the average height, whereas more individuals with higher systolic BP were above average height, which suggests that height does affect systolic BP. This may be due to the additional pressure needed in taller individuals to allow blood circulation.

Cryopreservation of beetroot cells in various solutions

Enzo Calcagno, Dylan Delaney, Luc Nguyen

The freezing of living cells results in rupturing of the cells’ membranes (lysis). The purpose of this experiment was to determine which of the many solutions prepared would be most effective in the cryopreservation of beet root cells. The amount of lysis of the beet root cells caused by endogenous ice nucleation was quantified using spectrophotometry. DMSO, which is a commonly used cryopreservant, exhibited the most protective properties against cell lysis. DMSO significantly (assume biostats were used) protected cells from rupturing. Although other experiments involving other chemicals (perhaps salts with high van’t hoff factor) could be conducted to try to attain the efficiency of DMSO at cryogenically preserving cells (ideally in human cells), it seems the commonly used cryopreservant DMSO has the best cryoprotecting capacity (amongst the solutions used) and has yet to meet its match.

Can Antacids Counter the Effects of Acid Rain?

Jordana Khouah, Emma Williams, Andrea Oliveira-Carneiro, Aynslie McIntyre

The objective of this experiment was to determine if antacids, such as Tums, are able to counter the effects of acid rain on pepper plants. In order to do so, a control group of three plants was made, where the plants were exposed only to acid, and an experimental group was made, where the three plants were exposed to the same amount of acid as the control group, however Tums were crushed and mixed into their soil. The acid used was sulfuric acid, with a pH of 4.3, which is similar to that of acid rain. The health of the plants was recorded by observing leaf and stem growth and development. The results showed that the antacids were effective in countering the effects of the acid rain, for throughout the experiment, not only did the plants in the control group grow less, but their leaves developed holes, shrivelled, and lost colour in some cases, as opposed to the plants in the experimental group who grew much sturdier and healthier in comparison, with essentially all their leaves intact.

Effect of Ibuprofen on the Lifespan of *Daphnia magna*

Simon Bustamante, Cassandra Koukoulomatis

A recent study has been done on three different organisms (*C. elegans*, *S. cerevisiae*, and *D. melanogaster*) demonstrating that Ibuprofen increases their lifespan. Our experiment's objective was to recreate this lifespan enhance in *Daphnia magna*. An experimental group exposed to ibuprofen and a control group of *Daphnia magna* were subject to the same environmental conditions. At the same time every day, they were fed and counted. An average lifespan of the organisms was calculated for both the control group and the experimental group.

The effects of Melatonin on *E. coli* growth

Jad Alkass, Michael Nikolidakis, Daniel Sikorski

As bacteria evolve and adapt to the various treatments that we use to counteract them, we must adapt to their resistances just as quickly. That was the aim of this experiment: to see if melatonin, the sleep hormone, influenced or inhibited *E. coli* growth. This was achieved by comparing the number of colonies of *E. coli* subjected to melatonin solutions with varying concentrations to the number of colonies of *E. coli* without the solution. The data provided by the two-tailed t test on the most effective concentration tested, seems to indicate a slight inhibitive property of melatonin on the growth of *E. coli*

Quantitative Analysis on Toothpastes' Ability to Eliminate Bacterial Colonies in the Mouth

Elizabeth Seguin and Sara Jean

A common fluoride based toothpaste was evaluated versus a sodium bicarbonate toothpaste which includes natural ingredients to determine the efficacy to exterminate bacteria in the mouth. Five samples were used to observe the decrease of bacteria on Agar plates. It was found that the common fluoride based toothpaste had a significant decrease in bacteria colonies while the natural bicarbonate toothpaste increased the number of colonies after use.

The Effect of Fast and Slow Tempo Music on Heart Rate of Teenagers' Aged 17-18

Rebecca Falutz, Harry Moroz, Leslie Unger, David Rogozinsky

The purpose of this experiment was to investigate how different music tempos, measured in beats per minute, can affect the heart rate of 17-18 year old males and females. Overall, the aim of the experiment was to test if high tempo music can elevate the heart rate and low tempo music can decrease the heart rate. The assumption made in the hypothesis was that if the participant listened to music with a high bpm or a low bpm, then the participant's heart rate will increase or decrease respectively. During the experiment, a heart rate monitor was used, first to determine the participant's resting heart rate. Their heart rate was recorded again after listening to a song with a bpm of over 160 for two minutes and once more after having them listen to a song with a bpm of 80 for two minutes. The heart rates recorded initially and during the fast and slow songs were then compiled into two means, one of the difference between the heart rates after listening to the fast song and the resting heart rates, which was 12.65 and the mean of the difference between the heart rates after listening to the slow song and resting heart rates, which was 3.23. A T-test was then applied to determine their statistical significance. The calculated confidence interval for the fast heart rates was 5.84 and for the slow heart rates was 1.3, while the t-critical value from the table was 2.919. Thus, there is no overlap and our hypothesis was supported by the experimental data.

Ants' Evolutionary Avoidance of Pesticides

Valentine Ceballos, Marilou Binder, Hamila Hagh-Doust, Ledia Bello

The purpose of this experiment was to find out if ants have evolved, after thousands of years of natural selection, to steer clear of pesticides. Inquiring on whether ants have evolved to avoid these is important because scientists believe that pesticide resistance is one of the principal problems facing crop production, human health, and animal protection. To test this, we introduced two groups of twenty ants (living in their respective container) to strawberries; one group had natural and organic strawberries, and the other had strawberries that were heavily sprayed with insecticides. A difference in the number of ants on or around the strawberries was noted between the control group and the experimental group. After performing a t-test, the two-tailed P value was found to be 0.0001, which means that the difference, by conventional criteria, is statistically significant. In other words, the ants explicitly avoided the pesticides, which could be an indicator that they have evolved to detect and avoid hard chemicals of the kind

The Relationship Between *Daphnia's* Reproductive and Phototactic Behaviour

Mathilde Bélaïr, Tinh Bui (Leo)

Daphnia magna, commonly known as water flea, are one of the primary consumers in the aquatic ecosystem. They also have been examined in laboratory to observe their phototaxis. We conducted an experiment to test if there was any correlation between their phototactic and reproductive behaviours. The daphnia were divided into two groups: one in the light and one in the dark. After a few days, the numbers of offsprings reproduced were recorded and compared. The data collected were, however, statically insignificant which suggests that light has no effect on *Daphnia's* reproduction.

The Consumption of Styrofoam by *Tenebrio molitor* Mealworms

David Bouhadana, Noah Matarasso, Sarah Elbaz, Yann Bouhadana

Plastic debris, specifically Styrofoam, contains chemicals that have detrimental effects on human health and ecosystems. These debris have been buried in landfills rather than recycled properly and have been accumulating over time. *Tenebrio molitor* mealworms are able to degrade styrofoam. Our aim was to measure the amount of Styrofoam that these mealworms could consume compared to their typical diet. It was hypothesized that *Tenebrio molitor* mealworms are more efficient at eating Styrofoam rather than bran. In order to test the hypothesis, a control containing 12.93 grams of mealworms were fed one gram of bran for four weeks. The test group also contained 12.93 grams of mealworms and were fed 1 gram of styrofoam over the same period of time. The mass of both the styrofoam and the bran were each measured every week in order to compare the two amounts of consumption. The t-test that was calculated indicated that these differences were statistically insignificant. Therefore, our results were not supported by our hypothesis. However, this experiment showed that the *Tenebrio molitor* mealworms can consume a substantial amount of styrofoam. Thus, these mealworms should be considered, on a larger scale, as a method of decomposing plastics.

Does Competition Enhance or Hinder One's Performance?

Gabriella Spacagna, Laurence Barrière, Carla Egho, Christelle Jenno

The purpose of this experiment was to determine if the presence of competition enhanced or hindered the performance of individuals. Previous scientific studies such as those performed by Hoxby, Ding and Lehrer, have shown that competition strongly enhances an individual's performance as it stimulates them to push themselves and in consequence perform better. Based on our background research we formulated a hypothesis that individuals in the presence of the competitive factor would perform better than those without it. To test our hypothesis we created a twenty-nine question questionnaire that consisted of general knowledge questions. We asked a total of 80 individuals between the ages of 15 to 25 to complete it. Half of the subjects, identified as our control group, answered the questionnaire in a room by themselves and the other half, identified as our experimental group, answered the questionnaire simultaneously in a same room. After conducting the experiment, the mean result for correct answers out of twenty- nine questions for the control group was 20.48 ± 0.83 and 22.55 ± 0.83 for the experimental group. Both results have an alpha level of 0.05 and/or 5% and are therefore significant. Based on these results we concluded that competition enhances one's performance since the mean result for the experimental group is of a value that is 2.07 ± 1.66 greater (9.18% greater) than the one observed for the control group

The Placebo Effect on Running Time

Miranda D'Intino, Laura Fiorentino, Laura Di Giovanni & Emma Del Buey

This experiment was designed to test the placebo effect on the brain. The aim was to verify if students' brains could be tricked into believing that a fake energy drink would make them run faster. This drink was made up of a fruit flavored, non-caffeinated tea and the test subjects were told it contained a very powerful pre-workout powder which would increase their energy levels, and thus make them run faster. In the control run, each runner was timed before given the placebo, and again afterwards in the experimental run. The results showed no significant difference between the two groups. Therefore, it cannot be said that the placebo had an effect on running time.

Is Gender a Factor in Human McGurk Responses

Tal Brandis, David Gabay, Emily Gilcher, Amanda Schubert

In this experiment, the McGurk effect was tested to see how much of an impact vision had on an individual's hearing and whether or not females were more affected by this phenomenon than males. The McGurk effect stated that when people see and hear two different sounds at the same time, they tend to hear a new sound due to visual and hearing influencing speech perception. Through research, it was found that females would be more affected by the McGurk effect than males due to females being attentive to facial expressions and relying more on vision rather than hearing. Individuals were tested consisting of 20 males who were the control group and 20 females who were the experimental group. They were presented with two videos in order to determine which gender would be more subjected to the McGurk effect. The results were then analyzed using a one-tailed t-test. The mean for females that were affected by the McGurk effect for the first and second video was 0.80 and 0.90 while the mean for males that were affected by the McGurk effect was 0.85 and 0.80. The confidence interval indicated that there was no significant difference between males and females. Therefore, it was not possible to conclude whether or not either gender was more affected by the McGurk effect

The Influence Of Pitch on Vocal Preference in Humans

Melissa Axiotis-Perez, Talya Diner, Taylor Morganstein, Catherine Barbier-Huot

Knowing that men possess higher levels of testosterone and, as a result, have generally lower pitched voices, the experiment examined whether women preferred a relatively low pitched male voice to a relatively high one. At the same time, it was examined whether or not the same were true for male preference in higher female voices. Ultimately, it was decided to determine if voice pitch had an effect on overall attractiveness of a speaking voice for both genders. It was hypothesized that women would prefer lower voices in both men and women due to their association with masculinity and men would prefer higher voices in both men and women due to their association with femininity. This was accomplished by recording two female voices and two male voices: one relatively higher and one relatively lower for each. 15 women and 15 men were then asked to listen to each recording and state their preferences. Ultimately, women predominantly preferred lower pitched voices for both male and female voices with ratios of 2:1 for female voices and 3:0 for male voices, as hypothesized. Men however, did predominantly prefer lower pitched voices for male voices with a ratio of 4:1, but the results for preference in female voices was evenly divided with a 1:1 ratio. These results only partially prove the hypothesis, as it was expected that men would prefer the higher pitch voice in both men and women. After further speculation, it was proposed that the deviation in the results from the hypothesis could be due to the fact that males prefer voices with pitch more similar to their own.

The Effect of Phosphates on the Cognitive Abilities of *Pimephales promelas*

Nicole Amir, David Aronoff, Emily Aronoff, Zachary Bensemana, Felicity Brassard

A common form of pollution today is the runoff of fertilizers, causing the phenomenon of eutrophication in water. The excess phosphorus in bodies of water gives rise to a surplus of water-plants and consequently leads to the aquatic life suffering from a lack of oxygen. Therefore, we examined the effect of this phosphorus on the cognitive abilities of the rosy-red minnow. In the experiment, the fish were grouped together and tested for the speed at which they were able to navigate a Y-maze. The use of landmarks throughout the maze provided the fish with the memory of where the presence of food is located. After tabulating the results, the statistical analysis led to the conclusion that phosphate does not significantly affect the cognitive abilities of minnows, therefore the null hypothesis was accepted.

Making Sense of Scents: How Citrus Smells Affect the Human's Memory

Sarah Levi, Abhirna Kanagasingham, Ariane Pinet, David Vaillancourt

Past research has suggested that humans exposed to certain odours experience an increased mental performance, which is believed to be due to the subconscious association of a smell to an idea or a concept. This project aims to further explore the relationship between one's sense of smell and memory, and it is hypothesized that smells, particularly citrus ones, could be used to enhance memory recall. This experiment focused on the differences in memory recall between two groups of thirty participants; one of which was exposed to Febreze's "Sweet Citrus & Zest" scent, while the other was not exposed to any scent. Each of the participants were given ninety seconds to remember fifteen words, and were then asked to write down what they could remember. The mean grade obtained for the group under normal conditions was 60.47%, whereas that for the experimental group was 69.33%. The results obtained were then analyzed with the use of a one-tail t-test, which showed a statistical significance between the two groups. This proposes that the use of the scent did, in fact, have an impact on improving the memory retention of the participants, which supports the notion of a link existing between memory and smells.

A Natural Air Quality Detector? We're Lichen it!

Jade Boutot, Ouïam Meftah, Olivia Roose

Over the last decade, air pollution has become an ever growing concern and has had an important role in the many environmental changes that we are witnessing. It has been proven that we can simply look for lichen (a symbiotic organism) on our trees to learn more about our regional air quality. Previous studies conducted in Israel, Spain and even in Montreal (in 1970) have shown that there is a relationship between industrialization and the growth and dispersion of lichen. We thought it would be a great idea to update the results found almost 50 years ago in our city. To do so, we selected 5 trees in an urban area (Downtown Montreal) and 5 trees in a rural area (National Oka Park) to analyze their lichen with a computer program. We hypothesized that lichen would be more abundant in the rural area studied. In Montreal, 7.51% (\pm SE 1.91, n=5) of the trees' surface areas were covered in lichen compared to 29.02% (\pm SE 5.12, n=5) for those in Oka. The experiment showed that the trees in the rural area had significantly more lichen since the gap between the two is 14.5 (gap > 2SE). Therefore, our results supported our hypothesis. We can conclude that there is indeed a much larger amount of lichen on the trees in Oka than on those in Montreal which tells us a lot about the severity of air pollution in urban areas.

Effect of stress, caused by performing a limited-timed evaluation, on the heart rate of adults vs. pre-adolescents

Jeanny Giang, Ferial Djebbar, Ariunjin Otgontsagaan and Therese Nguyen

Prevention Method of Spreading *Ophryocystis elektroscirrha* Spores in Laboratory Reared Monarch (*Danaus plexippus*) Population

Maggie Blondeau, Nicholas Danopoulos, Alexandre Pham, Suthan Sinnathurai

- 1) Because of the 78.35% mortality rate of monarch butterflies in the 2016 Monarch Project at Dawson College, a solution to reduce the cross contamination of the sporing parasite (*Ophryocystis elektroscirrha*; OE) causing the deaths was found. We believe washing hands with common soap will reduce the number of OE spores found on human skin.
- 2) OE is a protozoan parasite that as a spore on the wings and body of a grown butterfly, is introduced to milkweed plants when the monarch lands on it. OE either kills monarch pupas during metamorphosis, or the monarch emerges with other OE induced consequences (e.g. disfigurement).
- 3) 3 trials of washing hands after handling OE infected monarchs to reduce the amount of spores attached to the skin were performed.
- 4) The average amount of OE spores present on fingers before hand wash and after hand wash were 488.3 and 0.66 spores per millimetre squared respectively.
- 5) There is a significant difference between the amount of spores per millimetre squared before washing hands versus after. This shows how using common hand soap can reduce spores found on fingers by 99.9986%, helping to reduce the cross contamination of OE spores due to human contact.

French CE Projects

Guérir ou détruire: telle est la question

William Asselin

Au jour de technologies en mouvance perpétuelle, on interroge la valeur et l'impact du savoir pris pour acquis. Dans ce travail de vulgarisation, nous tentons de comprendre et d'expliquer le mécanisme de fonctionnement du blocage nerveux, déjà une facette méconnue pour le grand public du monde médical, ainsi que des armes chimiques de type gaz neurotoxiques comme le sarin. Il nous apparaît que les neurotransmetteurs, particulièrement l'acétylcholine, jouent un rôle clé quant au mécanisme d'action de ces deux technologies. Une recherche raffinée par des consultations avec des experts nous permet de conclure que ces deux technologies, aux résultats radicalement différents, sont issues d'une même compréhension du corps humain et elles ont un mécanisme d'action similaire à quelques différences clés. Comme quoi les technologies ne sont pas intrinsèquement ni bonnes ni mauvaises et il en retombe d'un devoir citoyen de les comprendre; surtout si elles jouent un rôle dans l'arène politique ou sociale.

Jusqu'où peut mener une commotion cérébrale?

Sarah Sarlabous

This project is about the dangerous consequences of concussions. The evaluation of the symptoms and the possible complications to a bad treatment can cause various life threatening situations.

La nanocellulose, une substance écolo?

KunYi Wang

Dans une société moderne comme la nôtre où richesse et statut social sont la norme, la dégradation de l'environnement est devenue une cause négligeable et anodine. Cependant, il y a toujours quelques individus conscients qui s'inquiètent des conséquences environnementales. Par exemple, l'écrivain François-René de Chateaubriand souligne que « Les forêts précèdent les hommes, les déserts les suivent ». En effet, plusieurs considèrent le réchauffement climatique comme une cause perdue, puisqu'on doit se vouer à des mesures draconiennes afin de résoudre le problème. Pourtant, Hubert Reeves croit autrement, et dit: "À quoi bon soulever les montagnes quand il est si simple de passer par-dessus." En d'autres mots, il faut identifier les moyens les plus efficaces afin de résoudre un problème de grande ampleur. Justement, une découverte récente nommée la "nanocellulose cristalline" nous permettra peut-être de réduire l'empreinte écologique de la population mondiale. Mais la nanocellulose est-elle réellement une substance révolutionnaire qui pourra faire une différence environnementale? En considérant sa structure innovatrice, sa production massive et ses capacités écologiques, les points positifs de la nanocellulose pourront contrebalancer ses coûts aberrants et sa complexité de production.

Riemann Zeta poster

Christian Ivanov

The Riemann zeta function is an important function in number theory and at the heart of a million-dollar mystery that has evaded mathematicians for centuries. It has very close ties to the distribution of prime numbers which has eluded mathematicians for millennia, and we may be close to finding the key to crack it... or are we?

Les carrefours giratoires: la voie du futur?

William Harris

Bien que nous soyons confrontés à de grands problèmes de congestions au Québec, il semble qu'aucune alternative aux feux de circulation et aux panneaux d'arrêts ne soit explorée. Dans ce travail de recherche, nous analyserons le carrefour giratoire en tant qu'alternative aux aménagements routier déjà installés. Plusieurs recherches démontrent que l'installation de carrefours giratoires permettrait d'améliorer les déplacements automobiles et de réduire les délais, tout en augmentant la sécurité des automobilistes, des piétons et des cyclistes. Pouvons-nous recommander l'installation de carrefours giratoires au Québec?

Optimisation d'un programme informatique pour la comparaison d'images cérébrales

Meliane Carrier-Favreau

L'équipe de recherche de Dr. Helene Nadeau développe un programme qui compare plusieurs paires de cerveaux humains à l'aide d'alignements de leurs images tridimensionnelles. Il déplace chaque voxel du cerveau sujet selon un algorithme non-linéaire pour progressivement s'approcher du cerveau cible. À terme, le processus nous permet d'évaluer les différences de taille, d'orientation et de diffusivité entre le sujet et la cible. Ceci requiert une grosse puissance de calcul. En effet, une image d'un cerveau comporte au moins quelques centaines de milliers de voxel non-vides. De plus, notre expérience nous indique qu'il faut de vingt à trente itérations du processus d'alignement pour obtenir une bonne concordance entre le sujet et l'image cible. Il faut aussi varier les paramètres contrôlant chaque alignement pour obtenir le meilleur résultat. Par contre, plusieurs opérations peuvent être effectuées en parallèle, ce qui sauve beaucoup de temps. L'affiche proposée décrira notre projet de recherche et comment nous avons rendu le programme plus efficace. Grâce au calcul en parallèle et à un ordinateur très puissant nous avons pu obtenir de bons résultats dans des temps raisonnables.

<http://www.acfas.ca/evenements/congres/programme/85/enjeux-recherche/11/c>

Comment pouvons-nous rendre les routes du Québec plus écologiques?

Kameliya Aralova

Je me suis récemment intéressée davantage sur les problèmes écologiques de notre société. Je voulais en apprendre plus et éduquer les autres sur les moyens plausibles d'être plus écologique au Québec. J'ai choisi de parler des routes puisque presque tous les adultes peuvent être affectés par ce sujet. J'explique pourquoi nos routes actuelles ne sont pas écologiques et présente deux solutions à ce problème.

I recently have gotten more interested in the issues regarding our environment. I wanted to learn and educate others about what are some plausible ways to be more eco-friendly in Québec. I chose to talk about the roads because almost every adult can be affected by that subject. I present why our roads are not ecological and two solutions to this problem.

Independent Projects

Eau-Chaud

Arman Khachaturyan

This project is a working model of water heating system powered by our planet's sun. Placed on the roof, for optimal ray absorption, the "solar panel" would heat the water reservoir. Then the heated water would be pumped underneath the house to heat up the floor and by convection the whole room.

The Bonobo: an Unconventional Ape

Lyubava Erko, Éloïse Méthot-Boudreau

The purpose of this independent project is to raise awareness about the bonobo ape, which is found in the Congo Basin in Africa. This primate was only recognized as a distinct species in 1929, as it is closely related to the chimpanzee. Although it is very similar to its relative, the bonobo differs slightly in appearance, and significantly in character. It has been observed that these apes behave notably less violently than chimpanzees, and live in groups dominated by females. Much remains unknown about this primate. Yet, it is already on the endangered species list, as commercial poaching and habitat destruction contribute to its declining population. Thus, why should we strive to conserve the bonobo, and what can be done to protect this enigmatic primate?

Biomechemistry Research Technique

Juan-Carlos Sreng-Flores

The goal of the project was to discover the methods used to find the function of a protein, or its effect over either the over stimulation or its inhibition. The basic experiment that was done is to use the glowing protein as an experimental data, and to see how it affects the cells with this over expression of this protein.

Demystifying Influenza

Gio Mrakade and Mihaela Talpos

Have you recently caught a cold? Or was it the flu? What's the difference anyways, right? Actually it's a whole different virus. Not only that, but each of these viruses have numerous subtypes. We are going to attempt to demystify the influenza virus and its interactions with the human body. More specifically, we will be looking at how the influenza virus infects the cell and how it uses those mechanisms to reproduce itself. Even though so many people are infected by the Influenza virus every year, not many people know much about it. This is why our goal is to present this information in an accessible way to allow anyone to understand the workings of this common infection.

Note: This project will also be given as a display/demonstration and a scheduled talk

Group Internship in Brain Imaging Research

Helene Nadeau for the group

In the summer of 2016, 24 very dedicated students completed the group internship on Brain Imaging. They learned the background together and worked in pairs on several research projects, at Université de Montréal, at McGill University, at the Douglas Institute and at Dawson. These projects are summarized on the posters made last summer and displayed at Science Fest. To find out more about the research skills developed, ask: Ines Abdelkefi, Ikram Aslam, Mohadeseh Azimi, Brianna Brown-Viaud, Méliane Carrier-Favreau, Erica Chelini, Chelsea Chisholm, Denis Chmoulevitch, Myriam Dimanche, Danny Dinh, Isabela Dragomir, Owen Dunkley, Nikol Govshievich, Alexander Hassler, Asha Islam, Ines Jaumier, Eric Krochmalnek, Ilyas Mohamed, Mavesa Nguyen, Xue Wei Tan, Amanda Trevisonno, Camille Valentin, Han Yan Xue or Mariya Yordanova

The Elusive Neutrino

Team Dawson Technicolor

Jad Alkass, Jon Boretsky, Simon Bustamante, Ana Hoban, Joe Loiselle, Liam Marengere, Armando Scappaticcio, Manuel Toharia, Joel Trudeau, Alain Vergara.

Each year student teams from around the world are invited to propose a particle physics experiment to be carried out on a functioning synchrotron beamline at CERN in Geneva, Switzerland. This poster is the outline of this year's Team Dawson Technicolor proposal: Determining An Upper Mass Limit of Muon Neutrinos Using Energy-Momentum Conservation.

Note: This project will also be given as a scheduled talk

Departmental Posters

Ecology & Culture Complementary Course

Register with Tonia DeBellis, tdebellis@dawsoncollege.qc.ca

Biology Department

Learn about how you can take part in the amazing student trip to Costa Rica. Experience one of the most biodiverse places on earth while immersing yourself in a completely different culture. Broaden your definition of "classroom". To register for January 2017, contact Tonia DeBellis and be sure to check out the student presentations from last year's group (p. 10) this week during ScienceFest.

Project Abstracts – Displays & Demonstrations

Crocheting the Hyperbolic Plane

Meliane Carrier-Favreau

Come touch mathematics! For my independent CE I used crochet to make a pseudosphere and a model that shows some of the properties of the hyperbolic plane using an order five square tiling, meaning that five squares meet in one corner. In hyperbolic geometry, surfaces have a constant negative curvature. This means that two lines can cross and both be parallel to another line, for example.

Note: This project will also be given as a scheduled talk

Seth Wonders... : The creation

Clara Scattolin

Science is the story of everything around us; it explains why the sun sets, how the earth formed, how your speaker emits sound and how you came to be. Sadly, not a lot of people appreciate science in this way. In their minds, it is a set of laws or equations. However, what people fail to see is that children have a natural curiosity about how the world around them works. Unfortunately, school tries to tell them what and how they must learn. This is not in their nature. I work at a camp that specializes in organizing ecology and astronomy themed activities. What I noticed is that when children are outdoors and left to their own devices, they are naturally curious; there are some things they just want to learn about. This often drives them to ask questions. However, if these questions get ignored or go unanswered, they give up on this story. To try to harness this natural curiosity, I wrote and illustrated children's book (for ages 6-9) about scientific questioning and discovery. I want to share my process as well as the final product in the hopes that people of all ages continue to explore the sciences in this way.

Note: This project will also be given as a scheduled talk

Robotic Hand

Michael Slater Covenden

I have constructed an artificial hand that articulates itself in a smooth and human-like manner using artificial muscles. These muscles are wires made of Nitinol, a shape memory alloy. When Nitinol wires have a current passed through them, they will deform according to their "memory". On a molecular level, the current has the effect of deforming the materials crystal lattice structure into a more compact one, causing the wire to microscopically contract, acting similarly to a human muscle.

This hand was constructed in addition to a timing circuit, so one may selectively pulse the individual muscles in any desired order.

Awkward

Sabrina Loudjani, Jad Alkass, Jacob Cunha

What exactly does it mean to be "awkward"? That's the question that first came to mind and inspired this entire project. So in order to find out what awkwardness really is, we decided to conduct a social experiment and discover for ourselves. We sat two people in front of each other next to a mirror, and asked them to talk to each other for 3 minutes while maintaining eye contact. At times some participants were asked to remain silent to see if we could easily provoke an awkward situation. Luckily for us, this worked surprisingly well, resulting in many different awkward scenarios. We thought that we might find a concrete answer to what awkwardness is and how it manifests itself, but with our preliminary data so far, we noticed each person exhibits awkwardness differently. Introverts were the most susceptible to this uneasy feeling, whereas extroverts managed to enjoy themselves. Also, each individual had their own unique way in expressing awkwardness which makes it much more interesting to observe. Through this study, we hope to come close to defining awkwardness.

Note: This project will also be given as a scheduled talk

Behemoth

Christian Ivanov

In 2015, I built a very solid design for the PontPop engineering competition, where bridges made out of Popsicle sticks and white glue are crushed by a hydraulic press. It did fairly well, at 1623kg, but it had one major flaw which severely hampered its performance.

Two years later, with the help of many people, I built the same bridge for the same competition and corrected the flaw. Despite many setbacks during the construction process and the bridge not being entirely finished for the competition, it demolished the all-time record of the competition with an impressive 5250kg, the first bridge to ever exceed 4000kg since 2006!!!

Note: This project will also be given as a scheduled talk

Railgun

Christian Ivanov

For my CE in Engineering physics I've built a small low-power magnetic railgun. It can accelerate very small bits of aluminium paper at moderate velocities using only the energy of a few 9 volt batteries. It is very weak and thus safe to operate, as long as one is careful not to zap themselves. The design it incorporated the use of knowledge from all physics courses I have taken at Dawson and thus represents the culmination of two years of hard work.

Worldline

Xuan Daphne Garneau-Wang

This project is a representation of the relative movements of the Sun, the Earth and the Moon along world lines through spacetime.

Arduino Servo R1 Prototype

Juan Cheng Li, Luis Sanchez

Our goal for this project was to become familiar with robotic gadgets. We chose to work with Arduino microcontrollers because it is the easiest system to work with and is a good introduction to robotics and software development. We created an automatic vehicle that avoids colliding with obstacles using an Arduino Ultrasound sensor. This is our first generation prototype exploring the use of sensors in robotics applications which we will continue in 2017-2018.

Rectifiers

Nadav Ami, Slater Covenden, Eitan Gabbay, Isa Nanic, Joel Trudeau

Rectifiers is a mixed media installation integrating elements of ongoing investigations undertaken by students of the SPACEcorp Research & Development collective. It comprises a 37 inch x 60 inch LED light-box with embedded electronics coordinated to reveal S.P.A.C.E. "GL.TCH" theme interpretations in the layers of imagery on the Plexiglas surface. Demonstrations will be given to show how the embedded LED components are powered, controlled and programmed.

Project Abstracts – Scheduled Talk

Study on Avian Influenza Propagation within Dawson

Xue Wei Tan, Madison Le Gallee

This project intends to study the potential effects of a contagious and life-threatening disease, avian influenza, on the population of Dawson College. It will consist in predicting the number of people that will be affected by the disease through the application of an epidemiological model, that of SIR, that maps the development of a chosen disease for a given time period. We will be simulating an SIR model plot, built using realistic estimations of variables regarding the propagation of the disease (gamma, beta, basic reproductive ratio, etc.). Data collected from a survey distributed to a portion of the Dawson population, will be used to define these variables. The goal of this project is to evaluate Dawson College's capacity to deal with larger outbreaks of disease, if it were ever confronted with a viral outbreak such as influenza. By observing the results of the SIR model, we hope to be able to provide ways in which implementation of health measures may be improved within the school.

The Remarkable Way We Eat Pizza: An Inquiry into Gauss's Theorema Egregium

William Asselin

From explaining the way we can eat pizza, to making roofs more solid and toilet paper ingeniously more practical, we inquire into deriving and understanding Gauss's remarkable theorem and how well it demonstrates how mathematics permeate these dimensions we live in.

Live or Let Live: Lions vs Humanity

Emma Touchie, Jennifer Ghetler

This project will be exploring the relationships between humans and the lion population around the world. The three main forms of contact between human and lions are through hunting, zoos, and wildlife sanctuaries. We will discuss the positive and negative effects of each form of contact and conclude which will enable the best outcome for the present and future lion populations.

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Crocheting the Hyperbolic Plane

Meliane Carrier-Favreau

For the last year I have been learning about hyperbolic geometry, but when did my project really start? The processes of creating and discovering don't happen because you will them to; every day is filled inspiration. With no true beginning, my project grew organically and it evolved as I learned more. Would you believe that two lines can cross and also be parallel to another line? Then, it took a shape of its own because the threat of failing or not being smart enough were crushed by an exhilarating freedom to discover for no reason other than to have fun.

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A Folding Universe: The Wonderful World of Origami

Madison Le Gallee

After participating in an epidemiological project, I realized that art can be an effective communicator, especially in the world of science. Modeling parts of the lungs using alveolar origami was an idea fed by my love for the artform. I've been folding paper for nearly 5 years now and it's opened my eyes to the incredible modeling applications of origami. This talk explores some of those applications.

Lab-stories: The Rectifiers

Eitan Gabbay, Joel Trudeau

Lab-stories is an annual video-based project with additional support from an Éducation et Enseignement supérieur Québec government grant. It is a framework for stimulating, supporting and sharing impactful learning activities that are collaborative and student-driven. Rectifiers was presented as an LED light-box installation in the S.P.A.C.E. "GL.TCH" exhibition integrating elements of ongoing investigations undertaken by students of the SPACEcorp Research & Development collective. Here we speak about the process of its creation and its relationship to GL.TCH to illuminate the corrections, modifications, tweaks, refinements, alterations, conversions, improvements, falsifications and overhauls students may employ in advancing their ideas.

The Elusive Neutrino

Armando Scappaticcio, Alain Vergara on behalf of Team Dawson Technicolor

Each year student teams from around the world are invited to propose a particle physics experiment to be carried out on a functioning synchrotron beamline at CERN in Geneva, Switzerland. We initially wanted to explore the question of how to detect dark matter. That turned out to not be feasible. We were interested in the question of how to detect something that is difficult to observe directly. So we decided to apply this idea to the detection of neutrinos. Our more feasible goal became to put an upper bound on the mass of the muon neutrino.

Gameday

Lara Kollokian

We often hear how important it is to learn to code. It is said to be one of the most important skills to have. As someone who didn't really know much about it, I didn't understand what the hype was about but wanted to get in on it. I think the best way to learn something is to teach it to yourself. The talk is about how I used what I learned in class as well as online resources to teach myself how to code a small game in java. I also want to give a girl's perspective to encourage other girls like me to get in on the coding hype.

Industrial Production of Penicillin

Panagiotis Retsinas

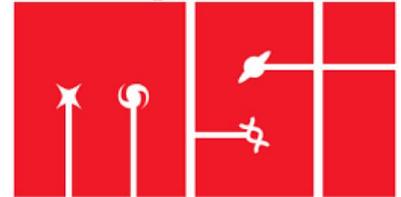
This research paper will go over the biosynthetic passage for the industrial production of penicillin. The process of fermentation will be explored to define the best fermentation technique, and the ideal environmental parameters will be defined. Important steps for the preproduction is the proper strain selection will be briefly explored as well, the separation of the product from its fermented broth and a short overview of the immediate applications of penicillin.

Notes

Notes



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