



McGill

Faculty of
**Agricultural and
Environmental Sciences**

Faculté des
**sciences de l'agriculture et
de l'environnement**



Internship Poster Event

**OCT 11 • 10AM-12NOON • MS2-022
SNACKS AND BEVERAGES PROVIDED**



**Office of Student
Academic Services**
Macdonald Campus

ALL STUDENTS WELCOME

Field Research Internship at the Kenauk Institute

My Internship at the Kenauk Institute

As an intern at the Kenauk Institute, a field biology research station, I assisted researchers collecting data for their respective research projects.

Throughout the summer, I helped scientists collect data for projects ranging from Honours theses to Masters degrees to PhD dissertations. The focus of these studies ranged from hydrology to entomology to ichthyology to herpetology. Therefore, I have acquired knowledge and experience from a wide variety of fields. Specifically, I now have a working knowledge of the inner workings of various environmental fields of study.

Furthermore, as part of my internship, I was required to design and execute a research project on a topic of my choosing. Therefore, I spent the summer doing an inventory of the bat population at the Kenauk Institute, a 65 000 acre fish and game reserve.



Fig 1. Sieving Soil to Collect Pure Soil Samples. Photo by Mercy Harris.

Description of What I Learned

During my internship at the Institute, I had the opportunity to meet and converse with researchers from various academic backgrounds. Through our discussions, I gained significant knowledge regarding the inner workings of graduate studies in ecology.

Moreover, as I was required to do a personal research project during my time as an intern, I gained valuable experience in project design. This was a daunting challenge at first. However, I now consider its completion to be my greatest success. I believe that these experiences will be of great value for my future career, especially since the skills I learned are rarely taught in academic settings.



Fig 2. Tree Climbing to Study Forest Tent Caterpillar Populations. Photo by Author.



Fig 3. Conducting Active Transects with an Anabat SD2 to Study Bat Populations. Photo by Emma Gillies.

My Independent Project

Title: Bat Acoustic Transect Survey at the Kenauk Institute

My project consisted of covering a series of transects on multiple occasions during the summer with an Anabat SD2 machine. My aim was to detect any bat activity. I would later analyse the recorded sonograms and identify the species that were detected.

Contact Information:

Gabrielle Ednie

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Employer:

Kenauk Institute

Liane Nowell

liane.nowell@taoco.com



Fig 4. Catching Dragonflies and Damselflies. Photo by Serena Mohamed.



Fig 5. Building Salamander Traps. Photo by Emilie Ladent.



Fig 6. Clipping Caudal Fins to Identify Tagged Fish. Photo by Shannon Clarke.

KENAUK INSTITUTE RESEARCH INTERNSHIP



Kenauk Institute
1000 Chemin Kenauk
Montebello, QC J0V 1L0
1-819-423-5573



I am holding a Largemouth Bass I caught as part of a project studying how catch-and-release fishing affects the behavior of fish. *Credit: E. Gillies*



I am shown collecting insects from a yellow pan trap as part of my independent project. *Credit: G. Ednie*



Here, I am climbing a tree to collect insect specimens as part of the Forest Tent Caterpillar project. *Credit: G. Ednie*

As an intern with the Kenauk Institute, I helped biologists collect data for many research projects. Studies I helped with included tagging bass, monitoring Forest Tent Caterpillar populations, and doing bat surveys.

I also had the opportunity to perform an independent research project studying pollinator communities. Over the summer, I designed the project and collected insect specimens. I will analyze the data as part of an honours project this year.

This internship allowed me to gain a better understanding of what it would be like to have a research-based career. In particular, collecting data for my independent project allowed me to improve my experimental design and fieldwork skills.

Furthermore, the opportunity to interact with researchers also gave me insight into the skills and education necessary for a career in research. As a result of my time at Kenauk, I now believe that though I enjoy field work, I do not want to pursue a career in academic research.

A Day in the Life of a Scientific Animator: Educating the Public on Contemporary Environmental Issues at the Biosphere

What is the Biosphere?

Unique in all of North America, the Biosphere is a museum that Environment and Climate Change Canada (ECCC) operates. By its mandate, the Biosphere raises awareness of current environmental issues vis-a-vie its many interactive exhibit halls and presentations given by the animation team.



Above: Myself in the middle of presenting Vitamin N



Above: Myself while placing a burdock seed pod on my shirt during one of my nature walk presentations
Left: A front view of the Biosphere

What was my role at the Biosphere?

I was a member of the animation team. As an animator, I was a facilitator in interpreting the museum's scientific content. I accomplished this through three key animations:

- *Vitamin N*, a presentation on the benefits of spending time outdoors and why we should rekindle ourselves to nature;
- *A Degree of Change*, a presentation on the cause of global warming, the impacts of climate change, and what we can do to face these challenges;
- and *Outside, A Whole New World*, a one-hour improvised nature walk to guide visitors around the natural scenery of Parc Jean Drapeau

What did I learn from my summer at the Biosphere?

The Biosphere gave me an opportunity to learn and refine my knowledge of the environment on subjects that I did not or have not yet encountered in my studies in Environmental Biology. At the same time, I had a perfect setting to apply everything that I already knew in a meaningful way.



Above: A hen and her ducklings by the pond, one of the sights I visit along my nature walk

Environmental education and Scientific Communication

My experience as an animator at The Biosphere

About the Museum

Being the only environment museum in North America, The Biosphere's mandate is to inform citizens about environmental issues and inspire them to take action!

My Role as an Animator

As a scientific student animator, my role is to interact with visitors in the museum and give different presentations throughout the day in both official languages.



Myself giving a presentation called *A Degree of Change*. It explores the science and impact of climate change and global warming. Photo taken by Marianne Gilbert.



Myself during a *Small N presentation*. It covers the importance of nature and our relationship with the environment. Photo taken by Roxane Richmond.



Myself with a group of visitors during an outdoor presentation called *Outside a Whole New World*. This interactive walk aims to highlight the history of the planet. Photo taken by Roxane Richmond.

What I learned

- How to communicate, interact and adapt to visitors of different ages and different educational, cultural and professional backgrounds
- How to effectively translate scientific information into educational content in a museum setting
- How to connect with visitors in a way that inspires environmental awareness and critical thinking
- How to handle tough questions and large crowds
- How to be a team leader



Myself in one of the display cases in the Biosphere. The display case is an interactive one that covers air & water pollution, energy, and different types of renewable energy. These are places where I interact with visitors & answer their questions. Photo taken by Gabriella Tavernese.

If you have any questions, please feel free to contact:
 Myself at gabriella.tavernese@mail.mcgill.ca
 My supervisor Isabel Julian at isabel.julian@canada.ca



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada



PROJET VIE: An Integrated Intervention Program for Children with Cancer

Drummond, K.¹, Curnier, D.^{2,3}, Caru, M.^{2,3}, Duhamel, G.^{2,3}, Alos, N.^{2,3}, Laverdière, C.^{2,3}, Sinnett, D.^{2,3}



¹ McGill University, Montreal, Quebec, Canada.

² Department of Kinesiology Université de Montréal, Québec, Canada,

³ Sainte-Justine University Health Center (SJUHC), Montréal, Québec, Canada.

PROJECT OBJECTIVES

1. Improve patient response to standard therapies, while increasing tolerance to secondary effects of the treatments.
2. Improve health related quality of life for both patients and their families.
3. Prevent and/or reduce potential long-term side-effects.

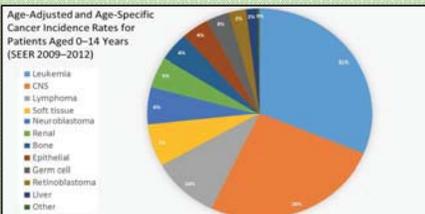
PROJET VIE

The project's overall mission is to improve patient health through the implementation of fundamental principles:

- Valorisation
- Implication
- Éducation

BACKGROUND

- Approximately 1 in 7000 children in North America under the age of 15 are diagnosed with cancer each year.
- Childhood cancers differ from adult cancers on various levels, and are the most common cause of disease-based death in children (>1 y.o.).
- Scientific advancements have contributed to significant increases in survival rate (>80%).
- Treatments are aggressive and exhaustive, producing short-term and long-term toxicities.
- Growing concern for the long term effects and health related quality of life (HRQoL).
- Health-based interventions, promoting healthy lifestyle habits, through physical activity and nutrition, present a prospective solution.



The graph illustrates the relative distribution of cancer types among children between the ages of 0 and 14, between 2009 and 2012. Acquired from the National Cancer Institute. (www.cancer.gov)



IMPACT ON PATIENT HEALTH

Musculoskeletal	<ul style="list-style-type: none"> • Myotome muscular fatigue • Cachexia • Inflammation/Edema • Osteopenia/Osteonecrosis
Neurological	<ul style="list-style-type: none"> • Peripheral neuropathy • Ataxia • Decline in cognitive capacities • Disorientation
Cardiotoxicities	<ul style="list-style-type: none"> • Chest pains (on exertion) • Abnormal resting heart rate (irregular) • Abnormal blood pressure
Cardiopulmonary	<ul style="list-style-type: none"> • Anemia • Dyspnea • Pains upon deep thoracic respirations
Systemic	<ul style="list-style-type: none"> • Lack of energy • Fever • Infections • Changes in nutrition, decreased appetite • Nausea

PHYSICAL ACTIVITY



EXPERIENCE

- A unique experience, whereby theoretical knowledge can be translated and implemented in a clinical setting.
- Opportunity to interact with a pathological population in a meaningful way and provide patients with a positive experience.
- Requires a basic understanding about the biology of cancer, the standard treatments, its implications on patient health and the fundamental principles of exercise.
- Provides insight into the health care system and the supportive roles the medical staff; highlighting the importance for cohesion and teamwork while providing quality patient care.
- Overall a challenging, intellectual, emotional, and gratifying experience.



The image depicts a portion of the Projet VIE research team at the Saint-Justine University Health Center.

ROLES & RESPONSIBILITIES

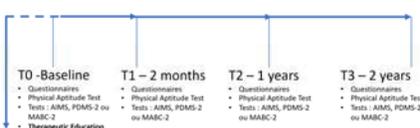
- Independent research and literature review.
- Interviews with patients and parents.
- Questionnaire-based assessment of current health status (Q-AAP, PedsQL-general /cancer, CSEP, HdV)
- Assessment of physical capacities through various tests evaluating: cardio-pulmonary fitness, flexibility, power, strength, etc.
- Promotion of healthy lifestyle habits
- Designing individualized adapted physical activity programs according to patient profiles.
- Conducting training sessions for hospitalized patients, patients in the outpatient clinic or patients at home via telemedicine.
- Dossier management; documenting patient interactions, important discoveries or patient developments.
- Attending clinical meetings with medical staff.
- Practicing hygienic standards, isolation protocols.

METHODS

- Projet VIE is part of an ongoing 2 year study, organized & conducted at the Saint-Justine University Health Center (SJUHC).
- The study began in June 2017 and is the first study of its kind, with the intentions of treating children up to 21 years of age.
- It is a phase I clinical trial, aimed to evaluate the feasibility and impact of health-based interventions within a pediatric oncological population.
- The control group will comprise 150 cancer survivors, who did not receive additional (nutritional, fitness-based) interventions during their treatments.
- The experimental group will include 150 recently diagnosed patients receiving supervised physical activity-based interventions twice per week in conjunction with traditional therapies.

Study Design:

Physical Activity Component Follow-Up Timeline 2 Years



Primary Follow-Up: twice/week through telemedicine system for 15 to 30 minutes during 2 years
Secondary Follow-Up: At Sainte-Justine University Health Center (Evaluations T0, T1, T2, T3)

- Interventions are conducted in the exercise lab, in the out-patient clinic, patient rooms and via telemedicine.
- Physical tests are re-evaluated periodically throughout the course of the study.



Inpatients participating in individualized physical activity-based interventions, conducted twice weekly. The image on the left illustrates a patient in his hospital room engaging in upper body exercises. The picture on the right illustrates a patient returning back to the outpatient clinic following an intervention.

Contact Information:

Summer Intern - Kenneth Drummond
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Employer - Daniel Curnier
Supervisor - Gabrielle Duhamel M.A

Policy Analyst and Program Coordinator

Natural Resources Canada (NRCan) – Smart Grid Program

Christopher Booth – Bioresource Engineering undergraduate



Figure 1: Natural Resources Canada's national headquarters at 580 Booth St., Ottawa, ON.

Employer background:

Natural Resources Canada is a federal department involved in the sustainable management, development and use of Canada's natural resources, including energy, mining resources, forestry, etc.

Program background:

The Smart Grid Program is a federal funding program supporting utility-led grid modernization projects, particularly those facilitating the integration of distributed renewable energy resources into the existing electrical grid. It was approved under Budget 2017 to allocate \$100M over four years to support worthy projects demonstrating or deploying pre-commercial technologies.

Job description:

The Program Coordinator participates in all program activities, including:

- program and project management tasks;
 - completion of project risk assessments;
 - scheduling and organizing meetings;
 - maximizing program learning opportunities;
 - managing correspondence with program applicants;
- collaboration with CanmetENERGY research labs and other organizations on various reports;
- briefing other program managers, directors, etc.

Learning outcomes:

NRCan exposed me to a wide variety of opportunities to develop skills and knowledge relating to:

- public policy;
- program administration;
- public-private relations;
- energy, innovation and other issues involving the electric power sector;
- proposal writing;
- project management and risk assessment, etc.



Figure 2: A news article describing the August 28 announcement of federal support (\$1.4M) to the ENMAX project implementing two-way power flow in Calgary's secondary network.

<https://www.cbc.ca/news/canada/calgary/green-energy-project-calgary-alberta-1.4801936>

Employment information:

- I was hired through a competitive application process under the Federal Student Work Experience Program (FSWEP).
- Once hired, I gained access to many career tools and it was easy to apply to other departments.
- The federal government provides strong long-term job security.

Contact information:

Christopher Booth
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Bioresource Engineering
undergraduate, McGill University





Do you have an ash tree?



Ash tree branch. Image : Charlotte Coutin-B.

1. The ash tree has opposite branching pattern.



Ash leaf. Image : Charlotte Coutin-B.

2. Its leaves are composed of an odd number of leaflets (5 to 11) and have opposite composite pattern.



Ash seeds. Image : Charlotte Coutin-B.

3. Ash seeds are paddle shaped and occur in clusters.



Ash bark. Image : Charlotte Coutin-B.

4. On mature as trees, the bark has a diamond shaped ridges pattern.



As an intern in the urban forest department at Ville de Montréal, I did promotion, field monitoring and administrative control of the ash tree subsidy programs.

Verification of the field compliance of an ash tree that has requested to be subsidized.



Verification of treatment holes
Image : Charlotte Coutin-Beaulieu



Verification of ash diameter
Image : Charlotte Coutin-Beaulieu



Verification of ash defoliation.
Image : Charlotte Coutin-Beaulieu



Complete training, urban ecological issue, lots of human interactions, constant support, introduction to the public domain, use of different softwares and tools (ArcGIS, precision GPS)



Sometimes repetitive, hard to implement new ideas, simple tasks

I have to treat my ash tree with TreeAzin if...

The treetop is showing less than 30% dieback.

Symptoms of ash tree when infested by the emerald ash borer

You live in Montreal, contact a contractor participating in the subsidy program for the treatment of ash trees. The subsidy covers \$4 per centimetre of trunk diameter treated.



1. Image : Charlotte Coutin-Beaulieu



2. Image : Charlotte Coutin-Beaulieu

1. Crown decline from the top down
2. Ash tree leaves eaten by emerald ash borer.

Profiles required ...



- French and English required (spoken and written)
- Driver's license required
- No specific knowledge on the emerald ash borer required
- Communication skills



3. Image : Charlotte Coutin-Beaulieu



4. Image : Charlotte Coutin-Beaulieu

3. Trunk perforated by woodpeckers
4. S-shaped galleries and D-shaped exit holes





Reception and waiting area of the hospital

Internship Information

Company: Pet Cares Professional Veterinary Services
Location: Tai Po, Hong Kong
Supervisor: Dr. Patricia Shuen
Contact Email: petcareshk@gmail.com



Surgery suite and X-ray room

My Job Duties and Responsibilities:

- Assisting the veterinary surgeon in consultations and surgeries, such as:
 - Measuring the patient's body temperature and weight;
 - Taking blood and urine samples, and
 - Recording anesthetic chart



Handling and bonding with a cat patient (Photo taken by Yansly Au)



Assisting the vet to collect blood samples of a mongrel dog patient

- Administering drugs and medications as instructed by the veterinary surgeon
- Performing laboratory tests
- Nursing care of hospitalized animals
- Cleaning and sanitizing cages and used surgical instruments
- Maintaining & filing records



A Shih Tzu came in with breathing problems (collapsed lungs). I was nursing the dog, to ensure it had sufficient oxygen supply. Also, monitoring its heart, respiratory and SpO2 (peripheral capillary oxygen saturation) rate.

What I learned:

- Common illness and diseases in cats and dogs
- Common vaccination and preventive care
- Identifying various symptoms of common diseases and illnesses of cats and dogs
- Understanding and analyzing blood and urine test results
- Performing different lab tests, such as complete blood count (CBC), blood serum biochemistry diagnostics, and urinalysis

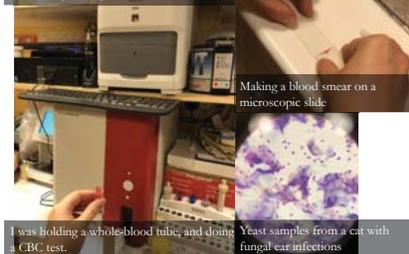


Bandaging and hanging up the dog's leg to prepare for Orthopedic surgery

2 Greatest Challenges:

1. To get the hang of handling and holding regular patients and sick animals skillfully and effectively
2. I have seen a lot of sick animals, sad and desperate owners, emergency cases and euthanasia cases
 - a. I was pushing myself not to express or "feel" any emotions because I thought it would be seen as unprofessional

Laboratory area: Blood Serum Diagnostic (top), and Complete Blood Count machines (bottom)



Making a blood smear on a microscopic slide

I was holding a whole-blood tube, and doing a CBC test.

Yeast samples from a cat with fungal ear infections

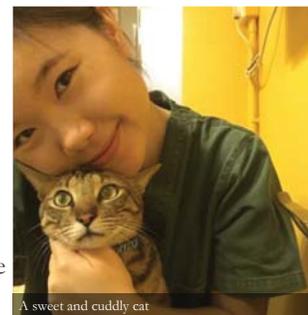
My Greatest Successes:

1. I was able to prepare the correspond vaccines accordingly, and understand thoroughly various laboratory tests
 - a. I could perform various blood tests on a professional front, and gained the trust from my colleagues
 - b. Therefore, I could perform these tests without supervision



Nursing a hospitalized dog. It wasn't eating due to the pain after surgery, and required force-feeding. I mixed the dog food with warm water and feed it with a syringe tube by squeezing the food into its mouth

It was an excellent opportunity for me to further pursue the field of veterinary as I will have direct interaction with animals, and observe daily operation of a veterinary clinic. Also, to see if pursuing veterinary medicine suites me. This internship contributed to my studies as I was given a chance to perform laboratory measurements for patients, such as weight, blood tests, and identify risk factors, which I have been learning throughout the years but without actual hands-on practices.



A sweet and cuddly cat

Helpful Tips:

1. Be prepared to work under pressure because the workplace can be very stressful sometimes, and people around you may be frustrated or stressed at the same time
2. Be prepared to face several emergency cases and euthanasia cases
3. It is OKAY to be emotional and mentally stressed, but most importantly, you should find an appropriate way to release the stress and emotions

DISCOVERING PROCESS ENGINEERING IN A WATER TREATMENT COMPANY

- ❖ Employer: VEOLIA Water Technologies- Oil & Gas (www.veoliawatertech.com)
- ❖ Supervisor: LEGRAND Sebastien (sebastien.le-grand@veolia.com)
- ❖ Student: AUDI Alexander Bshara (alexander.audi@mail.mcgill.ca)

A BRIEF DESCRIPTION OF WHAT I DID

During my 10 week internship with VEOLIA Water Technologies-Oil & Gas in France, I mainly worked on two large scale projects. The first involved an oily water treatment plant in Saudi Arabia and the second one, depolluting water from a chemical plant in the Netherlands through anaerobic processes. In the first case, the company I worked in acted as a mediator between the end user and the EPC contractor (Engineering, Procurement and Construction). For the second project, we were the actual EPC contractor.

I was given multiple tasks including drafting and implementing changes to diagrams used for the project, working on the equipment lists and updating HAZOP closeout reports (HAZard OPerability Review). I was even able to attend the actual HAZOP review meeting in the Netherlands. During which, several process engineers went over the diagrams and engineering documents to identify anything that could go wrong and decide what changes should be made to improve security.

Although I was able to work with technical material such as the diagrams, the main goal of my internship remained learning about the entire process, how all of the phases of the project relate to each other and which elements connect them. And most importantly, how an engineering team operates for major projects involving hazardous processes.



Self taken photograph with supervisor LEGRAND Sebastien (center) and technical manager BUSNOT Aurelien (left)

OVERCOMING CHALLENGES

Although classes I took at McGill (such as Fluid Mechanics, Pollution and bioremediation, Hydrology, Organic Waste Management, Graphics Design, Thermodynamics along with Mechanics and Materials) helped a lot, there were still many aspects I hadn't covered and this was very challenging at first. Eventually, I acquired more knowledge on the spot by attending conferences and exchanging with colleagues and, although I did not learn everything, I learned what I needed.

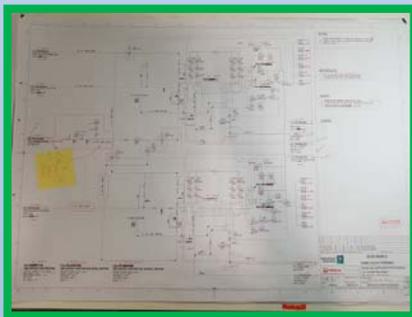
What I consider my greatest success is simply being able to take part in these projects and working on the same diagrams that they would use during construction.

INITIAL MOTIVES AND FUTURE CAREER CHOICES

I made the choice of working with VWTOG because I always wanted to contribute in improving the world we live in and I believe that water, one of the Earth's most valuable resources, should be kept clean and accessible. Since the company deals with treating polluted water, I wanted to see what it would be like to work on these kinds of projects. I enjoyed it, but I would also like to go work on the field next time (for project launching in particular) rather than in an office. I am thinking of exploring energy and waste management as well to check out other possibilities.



An example of a 3D model used for the projects



A PID (Piping and Instrumentation Diagram) with red markups (notes of what have to be reviewed)



The same PID when I was editing it in the AutoCad drawing software



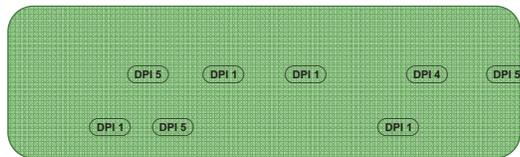
The HAZOP review meeting in the Netherlands

(right to left: BRINKMAN Iddo, LUGER Bart, BLUIJE Patrick, HOEK Wouter, KUIJVENHOVEN Jan, DAOUDI Merwan, AUDI Alexander). Photo taken by BRUNET Guillaume

TAKE HOME MESSAGE

There are three valuable lessons I've learned from this experience:

- First and foremost was the importance of clear communication and coordination as well as respecting deadlines. This is especially the case when working in large groups and with several other companies on a large scale project.
- Second, that even the smallest details can count in the long run especially during the planning phase; every possibility should be taken into account to prevent accidents from occurring, especially when working with hazardous processes.
- And finally, that although it is important to come prepared, it is also important to be able to adapt. Indeed, skills and knowledge are sometimes acquired in the heat of the moment. After all, this is what internships are for: to give a taste of what it is like to work in a certain field. And this is why I would encourage other students to take on any opportunity they may find, no matter how intimidating it may be.



Feeding Time



Brett bottle feeding a baby raccoon.
Photo taken by: Emilie Delcorde



Meal time with an injured big brown bat.
Photo taken by: Brett Moffit



Syringe feeding a baby striped skunk.
Photo taken by: Brett Moffit



Brett handling a newly admitted striped skunk. We try to handle the skunks often to ensure that they don't spray us every time we feed them and clean their cage.
Photo taken by: Alina Heumannskamper

My Daily Duties:

- Admit new patients
 - Paperwork
 - Assess condition and injuries
 - Develop a treatment
- Prepare food
- Feeding
 - Syringe feeding
 - Bottle feeding
 - Mush feeding
 - Solid food
- Fluid therapy
- Cleaning and dressing wounds
 - Mammal and reptile
- Administer medications
 - oral and injectable
- Vaccinations
- Cleaning animal cages at each feed
- Dishes
- Laundry
- Sanitizing cages for new admissions
- Sanitizing clinic
- Building cages
- Wiring cages
- Laying and leveling patio stones
- Cutting the grass
- Weed-whacking
- Public presentations

Employer Contact Information:
 Peggy Jenkins
 Email: peggy.jenkins@heavenswildliferescue.ca
 Phone Number: (519) 466-6636

Contact Information:
 Brett Moffit
 Email: brett.moffit@mail.mcgill.ca

Major Successes



An adult raccoon nicknamed Mr. Meanie shortly after being admitted to the center. He was hit on the 402 highway and had a broken leg, pictured on the left in a cast, a broken jaw in two places and several broken teeth, pictured on the right. After a long seven months he made a full recovery and was released back into the wild. (Far away from any large roadways of course.)
Photos taken by: Peggy Jenkins



A rehabilitated mapped turtle before its release.
Photo taken by: Brett Moffit



A juvenile eastern grey squirrel.
Photo taken by: Brett Moffit



A juvenile opossum after feeding.
Photo taken by: Brett Moffit



A group of juvenile raccoons enjoying a cool block of ice during a heat wave.
Photo taken by: Brett Moffit

Educational Presentations



Stinkerbutt and Ernie the educational skunks snuggling in their sleeping bag after a presentation.
Photo taken by: Brett Moffit



Educational Presentation Boards.
Photo taken by: Brett Moffit



Educational presentation boards.
Photo taken by: Brett Moffit

How I Benefitted From This Internship

Working at Heaven's Wildlife Rescue and Rehabilitation Center this summer let me gain the hands on experience with animal care that is crucial for applying to veterinary school. I was able to work alongside Peggy Jenkins who has almost 30 years of experience working with wild animals from Ontario. From her, I learned how to:

- properly handle wild animals in order to keep myself and the animal safe.
- assess injuries and conditions of small mammals and reptiles.
- calculate and administer medicines
- administer fluid therapy.
- care for the rescue animals that we admit.



A pile of raccoon roundworms in one of the juvenile raccoon cages at the farm.
Photo taken by: Peggy Jenkins

I also learned a lot about the diseases and parasites that each species we handle can contract. I learned how to diagnose things like canine distemper, parvovirus, and feline panleukopenia, as well as their treatment and pathogenicity.

THE OPPORTUNITY

ABOUT THE ORGANIZATION

The organization that hosted my internship is Bombardier Recreational Products (BRP). Although it was founded by Joseph-Armand Bombardier and was previously the same company as Bombardier Aeronautics (Bombardier Inc), BRP is a separate public company. It is located in Valcourt, a small town in the Eastern townships with a population of 1500 people. There are five main lines of product: personal watercrafts (Sea-doo), snowmobiles (Ski-doo), Roadster, all-terrain vehicles (ATV) and side by side vehicles (SSV). BRP is an international company with production sites located in Finland, Austria, Mexico, USA and Canada. The products are sold in dealerships all over the world in over 100 countries.



Valcourt Product Development Centre

THE DEPARTMENT THAT HOSTED MY INTERNSHIP

I was hired by the computer aided engineering (CAE) team. It's main goal in the company is to support tools of the engineering community. They manage support requests from designers and engineers related to multiple issues. In the past few years, the team has been working on the migration of the current systems to a new product lifecycle management software provided by Dassault Systems. This project is important for the company as it would allow an increased level of collaboration between all employees.

MY ROLE IN THE COMPANY

I was supervised by Martine Lecompte (a project leader in the CAE team) during my entire internship. As the main goal of our team was to provide support, we had to gather requirements and meet people from a variety of departments. I was assigned to do data analysis to provide insight on the areas of the product development process that still need improvement and facilitate the integration of the new PLM software.



CONTACT INFORMATION



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CONTRIBUTION OF MY INTERNSHIP TO MY FUTURE CAREER AND STUDIES

Working in the computer aided engineering department allowed me to meet people from different departments. I was able to build a better understanding of the role of an engineer in a big company. Working on the integration of a project lifecycle management software made me appreciate the design process we learned in my university classes. BRP also gave me the opportunity to discover many collaboration tools and design tools.

I am planning on coming back to BRP for another internship next summer and working as a consultant part-time throughout my studies at McGill.



Lab assistant

@ Barbados Government Analytical Services

jiahua.chen@mail.mcgill.ca



Job description

- Sampling water from tanks, taps and springs
- Testing water quality
- Conducting a community survey on Barbados Community Water Tank Policy



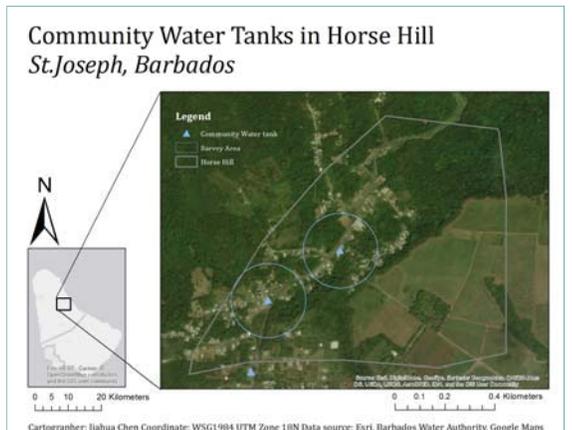
What I learned

I gained a broad and specific set of knowledge by working in the water microbiology lab. From water testing skills to qualitative research methods, this internship enriched my study with hands-on experience. I also got a chance to interact with different stakeholders, from Barbados Water Authority to local farmers. The biggest highlight was conducting a survey in a village and learning about local water issues. It was also a great opportunity for intercultural exchange.



Contact information

Barbados Government Analytical Services
Culloden Road, St. Michael, Barbados
(246) 535-1740
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Potable Water Sampling and Quality Determination Barbados

Siya Tong (from Shangrao, China) siya.tong@mail.mcgill.ca is a McGill B.Sc. (Faculty of Agricultural and Environmental Sciences) undergraduate student who spent summer 2018 in Barbados. She worked at the Government Analytical Services (GAS), Ministry of Agriculture and Food Security. She was supervised by Director Beverley Wood (Ph.D.) & Mr. Philip Beckles (GAS) and Dr. Danielle J. Donnelly (McGill University).



Barbados, a Caribbean Island, is one of the most water scarce countries in the world. Managed by the Barbados Water Authority, the Barbados Government Analytical Services and the Barbados Environmental Protection Department, it ensures that water supplied by the resource is safe for potable use.

This summer, supervised by Mr. Philip Beckles, Siya learned the methods to determine whether the treated water is safe to drink. She learned both water sampling and water testing. The major methods for water testings learned are HPC test for general bacteria and coliform and Pseudomonas by membrane filtration.



McGill



GOONIELAND

Pure Mountain Permaculture Farm & Earthship Golden, BC

Brian Lavoie
brian@knightriderracks.com
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U3 Environment-Food Production
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*Hempcrete Roof
in Action*



*Greenhouse for
Tomatoes*



*Hempcrete
Forms*



Landscape Design for Cherry Tree



Bottle Wall



Mushroom Stacks

This summer I had the privilege of working with hempcrete, a natural building product, on an Earthship. As well, I helped manage off-grid water and energy systems along with caring for pigs, chickens, and gardens.

Skills gained include garden design using permaculture, construction, especially with natural building techniques, a firmer understanding of the versatility of hemp, animal care, and site maintenance and management



Marine Mammal Care and Training Internship



McGill

Gigi de Fort-Menares
gigidfm@gmail.com



About the Location



- Interactive marine mammal park founded in 1964
- Bird sanctuary
- Aquarium
- Located on the island of Oahu
- Interactions available with dolphins, sea lions, rays and sharks
- Active in conservation projects including raising and releasing green sea turtles



The backstage pool area where I worked which housed four dolphins and one false killer whale. *Photo taken by me.*



The fish house where all the diets for all the animals in the park are prepared and sorted. *Photo taken by me.*



Gigi sorting capelin in early morning fish house. *Photo by Emilie Harrell*



Gigi cleaning a hydration tube used to give dolphins water. *Photo by Paula Caras*

Job Description

As an Aloha intern at Sea Life Park, I aided the dolphin trainers in caring for six Atlantic bottlenose dolphins and one false killer whale. These were the animals located in the backstage area of the park. A big part of my job was diet preparation and cleaning. However, I also helped trainers with a variety of tasks including husbandry such as eye drops, tooth brushing and wound management. I attended weekly lectures on animal training, animal behavior and animal physiology. I assisted dolphin trainers with training sessions and helped guests of the park when needed while answering any of their questions. I also helped collect data and observe the dolphins in our area. My primary responsibility was to assist the trainers in any way I could to help train and care for these seven marine mammals.

What I Learned

This internship taught me about animal training and marine mammal care. It taught me about the basics of operant and classical conditioning as well as the anatomy and physiological adaptations of a dolphin. Through this internship I learned about the challenges of a complicated and unstable work environment. The constant staff changes pushed me to be a more proactive learner. I carry myself more independently after the completion of this internship, as I chased after my learning. This internship helped me decide that although I do not want to be a veterinarian for marine mammals I do find animal behavior interesting and I might study it further in the future.



Gigi weighing out diets for the next training session. *Photo by Paula Caras*



Gigi assisting with a training session by acting as a guest. *Photo by Lauren Spencer*



Fig. 1 Ho'olono is an 11 year old Atlantic bottlenose dolphin.



Fig. 2

Fig 2 Kina is a 40 year old false killer whale.



Fig. 3

Fig 3 Nalu is an eight year old Atlantic bottlenose dolphin.



Fig. 4

Fig. 4 Boris is a 30 year old Atlantic bottlenose dolphin.



Fig. 5

Fig. 5 Adela is a 12 year old Atlantic bottlenose dolphin.



Fig. 6



Fig. 7

Fig. 6 BJ is a 33 year old Atlantic bottlenose dolphin.

Fig. 7 Kaiko'o is a 37 year old Atlantic bottlenose dolphin.



Internship in Indigenous Health Research: the Kahnawake Schools Diabetes Prevention Project



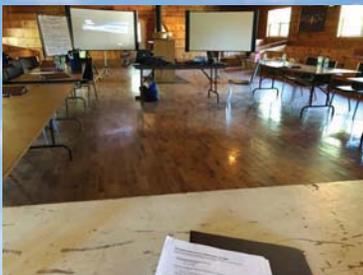
Sahna Fahim sahna.fahim@mail.mcgill.ca
U3 Human Nutrition
FAES 300 Internship 2

Supervisor: Dr. Treena Delormier (treena.delormier@mcgill.ca) - Scientific Director of Kahnawake Schools Diabetes Prevention Project (KSDPP)



About KDSPP

As an intern, I worked with the Kahnawake Schools Diabetes Prevention Project (KSDPP) on the Community Mobilization Training (CMT) process and impact study. KSDPP was created in response to documented high prevalence of type 2 diabetes in the Mohawk community of Kahnawake, QC. KSDPP's mission is to promote healthy lifestyles and prevent type 2 diabetes through community empowerment for the next seven generations. The Community Mobilization Training (CMT) was developed based on KSDPP's best practice, and its scale-up is being studied in Indigenous communities across Canada. My work focused the CMT project in order to improve the skills being taught and to promote community networking.



Presented and took notes at the annual CMT meeting held at a longhouse in Kahnawake
Photo credit: Sahna Fahim



Presented the results of the e-health questionnaire at Queen's University
Photo credit: Dr. Treena Delormier

Job Description

My role involved assisting the research team in developing an e-health component that communities can use to support and sustain the knowledge acquired during these health promotion trainings. I reviewed literature for other nutrition and health promotion projects and helped where needed.

Major tasks:

- Researched different e-health templates and models that are being implemented in various fields. Based on my research, I developed a questionnaire, which was presented and administered during the annual CMT stakeholder's meeting.
- Analyzed and presented the findings of the questionnaire to the multidisciplinary team working with KSDPP and CMT.
- Traveled to the field where I attended meetings and conferences where I took notes, and assisted with training of the community research assistants.
- Assisted in the health intervention training in Manawan, Québec
- Researched about chronic diseases related to malnutrition in the Indigenous society and the role of gender in health
- Helped update the KSDPP website



Meeting with the community research assistant in Manawan (Sonia Périllat-Amédée, Dr. Treena Delormier, Guyahne Ottawa, Sahna Fahim)
Photo credit: anonymous



Discussed about the e-health component with the community members of Manawan
Photo credit: Brittany McBeath

What I learned

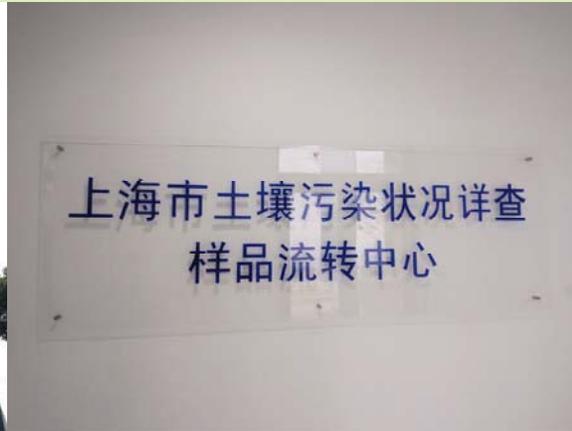
During this experience, I learned a lot about community-based research and was immersed in different aspects of working with a community. This experience raised my awareness and increased my knowledge on the problems surrounding nutrition in the Indigenous communities. Accessing community readiness and having a trauma informed approaches is important to empower the community.

My greatest challenge was independently organizing ideas around my main project at the beginning of the internship. However, discussing the findings with my supervisor and attending team meetings helped orient myself. The satisfying part of my internship was giving back to the Indigenous communities and working on a project which has a positive health impact. This motivates me to pursue a master's in this field.



Met with the community research assistant of Joliette (Mylene Ottawa, Sahna Fahim)
Photo credit: Dr. Treena Delormier

Summer internship in Shanghai Environmental Monitoring Center



The soil samples from all over Shanghai are sent to my department. My job was to set up a new package with the sample that were sent and the soil from control groups, assign them to different laboratories and relabel them.

Shanghai Environmental Monitoring Center is a governmental company which was served as the primary source of environmental data to Shanghai Municipal Government. Other than that, it offers various services including organic, inorganic, physical, biological and industrial hygiene measurements on a variety of matrices, sampling, analytical feasibility assessment and consultation, quality assurance and quality control in conformance with ISO Guide 25, sampling planning, technical assistance, preparation and on-site monitoring and analysis.

In different laboratories, the content of specific pollution in the soil such as heavy metal, fluorine, aromatic hydrocarbon etc. will be examined to inform the government of how polluted the soil in Shanghai is.



We were asked to build a database for all the retained soil sample. If the results obtained from the lab were not precise they will need to be tested again. At the late stage of our project, there were about 5000 retained soil samples that were from different locations in Shanghai. It took extremely long time to find specific soil sample from all the soil sample.



I was asked to test the microcystin-LR concentration of water sample from 35 different locations. This test was very complicated since there are 10 steps involved. Nevertheless, since this test is based on enzyme, the time length of each step must be controlled strictly. Otherwise, the test will fail easily.



FACULTY OF
Agricultural and
Environmental Sciences

FACULTÉ DES
Sciences de l'agriculture
et de l'environnement



Zhiding Zhou
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Internship At

SUNNY CREEK ORGANIC™

MY FIRST FARM EXPERIENCE



The farmer's market stall. The stall had a large variety of fruits and jams for sale which made it stand out from the rest. It was a good place to form a community with the regular customers.



This is a photo of me trellising the loch ness blackberries. This is a variety I spent most of my time working on. They are large and high yielding berries.

ABOUT
SUNNY CREEK FARM IS A FAMILY RUN ORGANIC FRUIT AND NUT FARM IN VICTORIA, AUSTRALIA. THEIR AIM IS TO PROVIDE THE COMMUNITY WITH LOCAL PRODUCE AND FRUIT PRODUCTS AND TO PROMOTE THE IMPORTANCE OF ORGANIC CERTIFICATION.



Tree frogs are a natural pest control for insects on the farm. Snails and slugs are one of the greatest garden pests, eating away at the flowers and leaves.



One of my largest projects while working on the farm was transplanting strawberries into hundreds of crates. The crates were then placed over old strawberry rows to avoid having to do a crop rotation in the area. There is a debate whether planting in crates should be considered organic or not.



- JOB DESCRIPTION**
- HARVESTING
 - SORTING FRUIT AND NUTS
 - PRUNING
 - TRELLISING
 - HAND WEEDING
 - MULCHING
 - APPLYING FERTILIZER

- PLANTING STRAWBERRIES
- WOOD CHIPPING
- ATTENDING FARMER'S MARKETS



Hand weeding was a slow tedious job, but it gave me a lot of time to reflect. It was done with only the help of a hand-held hoe. Weeding is done throughout the year, especially before the next growing season.

- OVERALL EXPERIENCE**
- LEARNED:
- CARING FOR A VARIETY OF FRUIT PLANTS
 - AUSTRALIAN WILDLIFE INTERACTIONS
 - ORGANIC CERTIFICATION IN AUSTRALIA
- CHALLENGES:
- PHYSICAL LIMITS
 - LONELINESS / ISOLATION FROM SOCIETY

CONTACT INFORMATION
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The Wilkins Lab

Olivia Wilkins, PhD

Assistant Professor

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H9X 3V9

Canada

(514) 398-8703

My Role

I spent this summer working in Dr. Olivia Wilkins' lab in the Plant Science department of McGill's Macdonald campus. My work revolved around developing protocols for genome engineering, however I also had the opportunity to write literature reviews, prepare two scientific posters, and dabble in lab techniques not directly related to my own project.

As a whole, the Wilkins lab studies abiotic stress responses in plants, specifically by modelling the complex networks of interacting components which regulate such responses. I was supported by an NSERC USRA and a supplement from FRQNT. The research was funded by an NSERC Discovery Grant to Dr. Wilkins.



Photo 1 The Wilkins Lab near the beginning of the summer. Photo credit: Phillip Rosenbaum

Independent Project

Reprogramming gene regulatory networks using CRISPR-Cas9

I helped adapt existing protocols for genome editing in plants to mutate promoter regions in *Arabidopsis thaliana*. The project required the use of bioinformatics tools, molecular cloning, plant cultivation, sampling, and other molecular biology techniques. This protocol should be able to create variation in desirable traits, which could help accelerate breeding programs.



Photo 2 Me, loading samples into a thermocycler for PCR, a common lab technique. Photo credit: Jérôme Gélinas-Bélanger.

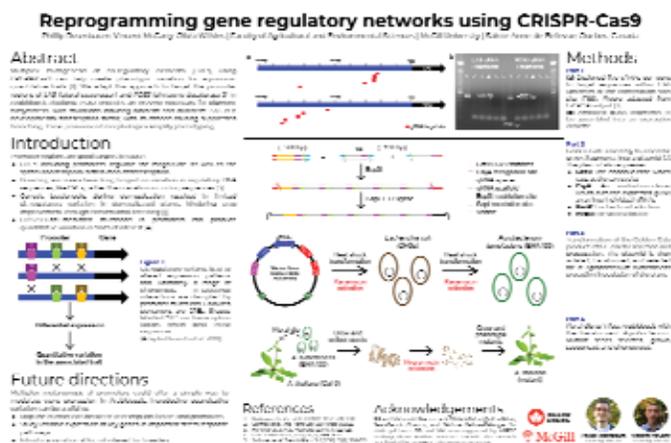


Photo 3 The poster I co-presented at Plant Biology 2018.

Photo credit: Phillip Rosenbaum and Vincent McCarty

Challenges

The protocols that we were developing attempt to fuse the published work of two notable labs, yet it often felt that we were in totally uncharted territory because some questions about how to proceed were not answered in the existing literature.

Successes

I co-presented a poster at the Plant Biology 2018 conference (Photo 3), which was well-received by experts and judges in the field of plant genetics and genome engineering. Despite hitting many technical obstacles in the lab, it was very rewarding when we were able to move beyond them.

Lessons learned

I was pleasantly surprised to learn how collaborative and welcoming science can be, even to undergraduates, both among lab members and between labs at international conferences. I also learned not to underestimate a lab project, even if it sounds simple or procedural at face value.

Optimal vegetation management for pollutant removal alongside highways.



Summer internship at the Institut de Recherche en Biologie Végétale.

Marco Centa, U4 Bioresource Engineering Student.

Email: marco.centa@mail.mcgill.ca

Supervisor: Prof Jacques Brisson (IRBV).

Email: jacques.brisson@umontreal.ca

Co-supervisors: Prof Danielle Dagenais (UDM) and invited researcher Margit Kõiv-Vainik



Project Description.

I collaborated on a project that involved the Quebec Ministry of Transportation and the IRBV.

My task was to setup an experimental device able to collect and store surface runoff from vegetated highway side slopes.

The aim of this project is to determine if the current vegetation management practices have an impact on the roadside water quality.

Experience Gained.

Throughout the summer, I had the opportunity to work in a dynamic multi-disciplinary team. I was comfortable working in a mix language environment.

The internship put many skills into practice. I designed a complete surface water recuperation system on a CAD software. I was afterwards involved in the construction of both the pre-prototype and prototype of the device.

I got a chance to use different tools that I had not previously used before.



Credits: Patrick Boivin

Carrying out the surveying of potential sites along HWY 20.



Credits: Patrick Boivin

Photo showing the installation of the runoff recovery system.



Credits: Patrick Boivin

Overview of the finished prototype installed along Highway 20

Challenges/ Successes.

This internship was fulfilling. I had different tasks to accomplish. This made it challenging because I couldn't necessarily complete everything myself. I needed the expertise of others to ensure that my contributions to the project made sense.

This internship made me appreciate my field of study and reinforce the idea that I have of what I want to accomplish once I graduate with my degree. I got to appreciate the different steps of building a working prototype. From research to designing in the laboratory and outdoors, to the installation of the prototype along the highway, every step was important and crucial for the outcome of the experiment. I was very happy to have guided the project smoothly and witnessed the end result.

Different Stages of Construction of Experimental Ditch at the Botanical Garden



Credits: Marco Centa

Credits: Marco Centa



Credits: Marco Centa

Credits: Patrick Boivin

Biochar, Berries and Greenhouses

An Internship in McGill's Biomass Production Lab

Sadie Moland (sadie.moland@mail.mcgill.ca), Employer: Mark Lefsrud (mark.lefsrud@mcgill.ca)
 Department of Bioresource Engineering, McGill University,
 21111 Lakeshore Drive, Sainte-Anne-de-Bellevue, QC, H9X 2E5

My Position

My job for the summer was to lead my own independent research project as well as to help a masters student with his research on the Canadian Integrated Northern Greenhouse. Both projects focused on topics of sustainability, food security and hydroponics. As the summer progressed, I picked up other responsibilities in the lab such as helping to propagate hop plants and helping to set up an LED experiment in the greenhouse.



Me working on a Nutrient Film Technique (NFT) hydroponic system. Image courtesy of David Leroux.

What I Learned About

Construction and design

- Building my own hydroponic equipment from scratch

Automated systems

- Using Arduino and managing sensors

Electrical soldering

- Repairing damaged light connections

Data logging

- Using HOBO data loggers

Lab techniques

- Using EC and pH meters
- Preparing nutrient solutions
- Analyzing samples and data



Misting chambers I designed and constructed.



A view inside the shipping container turned greenhouse



Experimental hop plants in the field

Going Forward

This internship has given me a strong foundation for future classes and my career. I have gained experience in engineering design, in working independently and with a team, and in the scientific research process. My favourite part, and the most challenging part, was developing my own research project and building all the hydroponic equipment myself.

Acknowledgements

I acknowledge the support of the Natural Sciences and Engineering Research Council of Canada. Research was possible thanks to Mark Lefsrud, Scott Manktelow, and David Leroux.



Independent Study: Testing biochar in combination with wood vinegar as a hydroponic growing substrate for *Rubus spectabilis*

Research Question: Can *Rubus spectabilis* (salmonberry) be grown hydroponically using biochar as a growth substrate?

Results

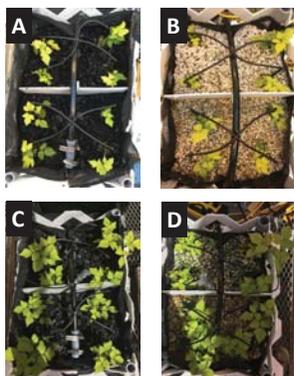


Figure 1. Comparison of *R. spectabilis* on July 24th (A & B) and August 9th (C & D). Left: BC; right: P; above spacers: + WV; below spacers: - WV.

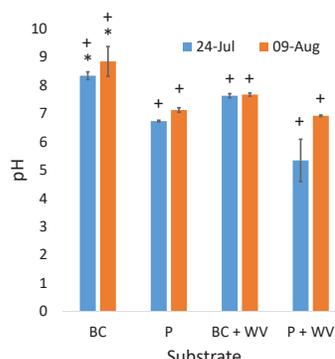


Figure 2. Bar plot displaying the difference in pH between substrates treated with and without WV. pH was measured on July 24th and August 9th. * = significance b/t dates; + = significance between treatments.

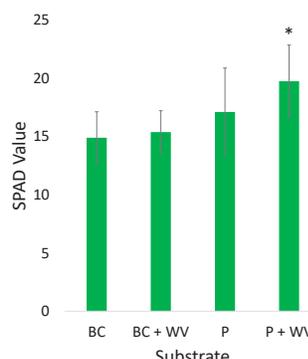


Figure 3. Bar plot displaying the SPAD values, measured on August 9th, for respective substrates.

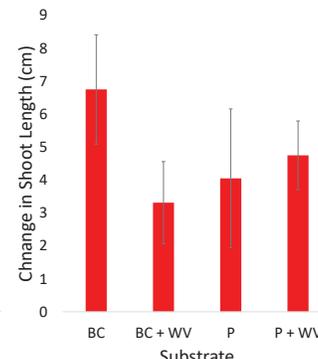


Figure 4. Bar plot displaying the changes in vertical growth over the period July 24th - August 9th for respective substrates.

Conclusion: It was demonstrated that biochar performs similarly to perlite as a hydroponic substrate for *Rubus spectabilis*, and that wood vinegar is an effective pH adjuster, but this research should be continued to identify long-term effects of these treatments.

How do Airports perform on Circularity?

My summer at Netherlands Airport Consultants

Santiago Sottill Duprat
Email: santiago.sottilduprat@mail.mcgill.ca

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The Company:

•NACO (Netherlands Airport Consultants) is a world-leading **airport consultancy and engineering firm** based in The Hague, the Netherlands. Since 1949, NACO has provided airport planning and design services to more than 600 airports, including: Amsterdam Schiphol, Frankfurt International, and Beijing International.

My Role as an Intern:

• I benchmarked the environmental performance of 43 airports around the world through several key performance indicators (KPIs), and I assessed which airports needed help in 4 focus domains: **Water, Energy, Emissions, and Waste**. I also did a comprehensive analysis of circular solutions for airport planners and developed the circular economy business case for the company.



Photo: Phuc Lee

Presenting final results to airport experts during a lunch lecture at NACO

What is Circular Economy?



Chemical Engineering Research Internship

Job Description

This summer, I worked as an intern alongside a PhD student in a chemical engineering research lab at l'École Polytechnique. Her research focused on the catalytic conversion of natural sugars to ethylene glycol in a fluidized bed reactor. I assisted in the experimental design setup and testing of the fluidized bed reactor and took on the project of researching and writing a scientific review article.

Knowledge and Skills Gained

I learned the basics of reaction engineering, including different types of reactors and basic reactions. I learned the synthesis and application details of spray-drying techniques and core-shell catalysts. I was also introduced to important analytical tools such as mass spectrometry (MS), particle size distribution analysis and high performance liquid chromatography.

I developed skills in scientific research and in using the document preparation system *LaTeX*. I developed laboratory skills in safety procedures, preparing solutions, trouble-shooting, setting up the reactor and running reactions.



The glucose feed and gas line connections at the inlet of the reactor.



Setting up the fluidized bed reactor inside the tubular furnace.



Checking all connections for potential leaks after turning on a safe gas flow.

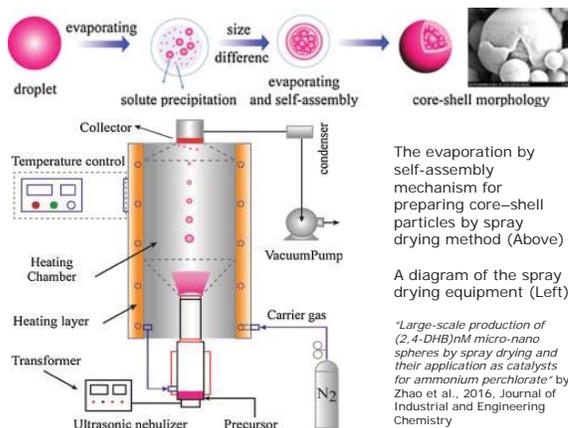


Tightening connections where leaks were found.

Photos of Meaghan Kilmartin taken by fellow intern, Lauriane Bricaud. Otherwise taken by Meaghan Kilmartin

A Brief Insight: Spray-dried Core-shell Catalysts

Core-shell catalysts are a unique class of particles that can enhance the catalytic performance of their constituent materials through the synergy of the core and shell components and improved structural properties. Their relative counterparts, hollow-shell, yolk-shell and multishell catalysts, exhibit their own structural benefits. Synthesizing these catalysts via spray drying provides the ability to tailor the catalysts to their application and increase stability, yield and recyclability. The characteristics of the catalysts, such as size, size distribution, porosity, morphology, and catalytic performance, can all be engineered by adjusting the many parameters affecting production. Spray-dried core-shell catalysts have been proven effective in many catalytic applications. However, they are still a newly developed choice of catalyst, and many more applications have yet to be discovered. An interesting asset to spray drying is the feasibility of replicating production on a large scale. Catalyst production can remain cost-effective, with potential for large scale industry applications.



Tips for Future Interns

Even if the internship you are applying for is outside of your field of study, it will most definitely be a learning and growing experience for you. Simply being in an atmosphere surrounded by dedicated researchers and graduate students inspired me to work harder. I am thankful for the opportunity to have worked in the welcoming and helpful atmosphere of Dr. Patience's lab group. It was refreshing to come into a team with a strong sense of community and teamwork while all working on their individual projects and degrees. As an intern, the important thing is to try your best and ask questions from your superiors and everyone around you. You are there to learn and take away as much as you can from the experience.



A version of the overall reaction setup, including pump, gas lines, reactor, furnace, thermocouples, exit trap, mass spectrometer and control unit.

Potential Use of Poplar Trees in

Wastewater Treatment



Margot Amitrano, Heidi Gough

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Introduction

- Globally, 80% of wastewater is returned to the environment without being treated
- By 2030, global demand for water is expected to grow by 50%
- Poplars survive in areas of flooding and saturation of soil where most other species do not survive

Methods

- Preparation of contaminated water by adding liquid fertilizer to plain water
- Hack kits, following US EPA equivalent procedures, to test concentrations for total nitrogen, ammoniacal nitrogen, nitrate nitrogen and orthophosphate in soil and water samples
- Total Solids test to obtain dry mass nutrient concentrations for soil samples



Image 1. Margot Amitrano watering one of the poplar trees with contaminated water using the plastic bottle

Acknowledgements

Thank you to those who helped with this project, Khaled Salam, Yash Chaudhary, Jennifer Kersh and Patricia Townsend.

Selected Reference

United Nations Water. 2017. Water Quality and Wastewater.

Results

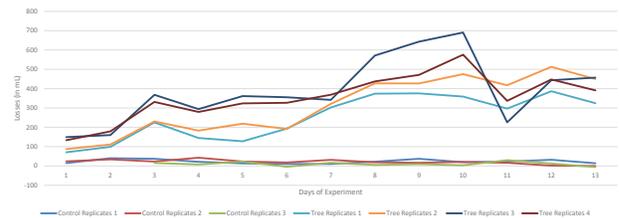


Figure 1. Losses from the system through evaporation and evapotranspiration each day per sets of replicates

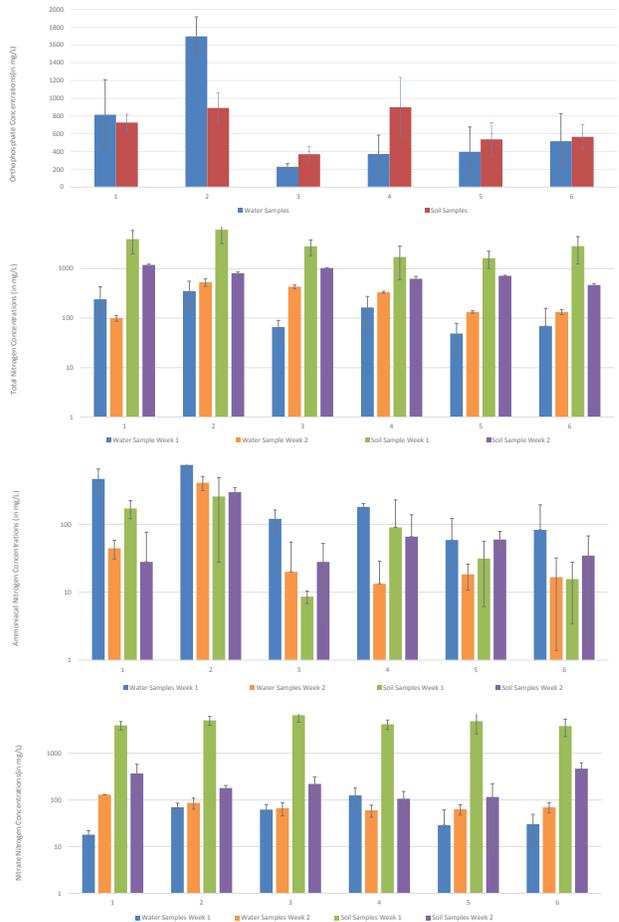


Figure 2. From top to bottom, level of orthophosphate, total nitrogen, ammoniacal nitrogen, nitrate nitrogen contaminations in both collected water and soil for different hydraulic loadings

Conclusion

- Significant decrease of contaminants in water outputs
- Varying hydraulic loading had no significant effect on output concentrations

Internship at the Quebec Ministry of Agriculture



Andrew Centa: andrew.centa@mail.mcgill.ca
FAES 300 Internship

The Department of the Quebec Government

The Ministry of Agriculture, Fisheries and Food of Quebec (MAPAQ) operates multiple programs in animal cultivation, agriculture and fishing and food processing. Its main role as a ministry is to assure and promote the prosperity of the bio-food sector and ensure the quality of food in a sustainable development perspective.

The MAPAQ also promotes programs to help the food industry create diverse and quality foods while protecting the environment and to support the development of Quebec and that of each region.

Job Description

My role this summer consisted of completing different projects relating to apple cultivation in the Laurentians.

- Apple tree insect scouting in two commercial apple orchards located in St-Joseph-du-Lac.
- Raising awareness for a governmentally regulated disease known as Fire Blight.
- Participating in Apple orchard compliance inspections..
- Validating and visiting projects funded by the MAPAQ.

Learning Experience

The work that I completed this year was extremely beneficial to me and gave me experience working in the public sector. Although it did not require me to use extensive engineering knowledge, it did help me learn concepts of agronomy indirectly related to bioresource engineering.



A picture of me sampling an infected apple tree branch during an inspection.
Picture Credits: Jean Baptiste Sarr



A picture of me at my workstation completing orchard modernisation reports.
Picture Credits: Janie Millette

**Agriculture, Pêcheries
et Alimentation**

Québec



Contact information:

Jean Baptiste Sarr, agronome, M. Sc.
Jean-Baptiste.Sarr@mapaq.gouv.qc.ca

Some notable skills I was able to develop.

- Raising awareness
- Completing field work
- Learning concepts in agronomy
- Teamwork in an office environment

Background Picture Credits: Jean Baptiste Sarr



Calculating carrying capacity in Ulloa.



While in Colombia I traveled to parts of my country I'd never seen before: Manizales, El Tolima, Buga, Tulua, Barragan, El Valle del Cocora, Duitama, and Pereira amongst others. I met young people with a passion for the countryside and determination to return to their family farms, and adults dedicated to the passing down of tradition and the conservation of a lifestyle.

A Cultural Experience, The CIPAV Foundation, and Silvopastoral Cattle Ranching

By Antonia Ruiz



Installing a solar powered electric fence in El Tolima.



Chiquiza Church and Plaza.



The CIPAV foundation, short for Centro para la investigacion en sistemas sostenibles de produccion agropecuaria, is a Colombian organization that was originally founded to solve problems related to sugar cane production. I participated in their **Sustainable Colombian Cattle Ranching** project that produced technical and monetary support to local farmers for the installation and success of **Silvopastoral systems**.



Preparing a soil sample in Duitama.



Delicious fruit from a farm near La Marina.

I visited around 60 farms, from those smaller than 1 hectare to those larger than 300 hectares, and learned from every producer, both those from the city and those with the tradition of generations.



Silage made of "Boton de Oro" or *Tithonia diversifolia*.



The Cardozo's European bee box.



Observing sheep weed control at La Hacienda Lucerna during the Heirs workshop.



Collecting *Tithonia diversifolia* seeds.



Stakes of Tilo ready for planting.

I participated in CIPAV's IV International Agro-ecology course lead by Miguel Altieri and Enrique Murgueitio, and learned about inspiring projects being realized on small farms all over the country during the Silvopastoral Heir Workshop.



Lucerna Cattle, generations in the making.



Manizales Colonizer's monument.

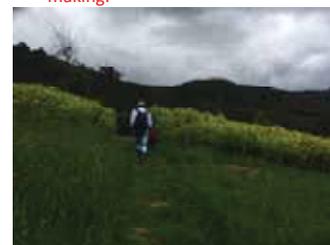
As an inexperienced first year student my role was limited, mostly collecting soil samples, taking pictures, and learning from my hosts, my experience gave me drive and direction to bring back to my studies at McGill.



Cattle in Barragan, 2,900 msnm.



Row of Tilo in La Pradera, Duitama.



Walking through La Pradera's pastures, Duitama.

I am immeasurably grateful to my supervisor, Enrique Murgueitio, and all the technicians and producers that taught and accompanied me this summer. When I have the skills I'll definitely give back.



Electric Fence Solar Panel.



Chiquiza Church



Source of fuel for the Biodigester!

Contact info:

enriquem@fun.cipav.org.co

antonia.ruiz@mail.mcgill.ca

Photos taken by Antonia Ruiz, Francisco Rivera and Daniel Candamil, 2018.

Stagiaire d'été au Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ)

Description du stage : Sous la supervision d'agronomes du MAPAQ, effectuer des suivis de projets au champ.



Cueillette, compilation et analyse de données pour des projets dans l'ail, camerise, pomme, fraise, sapin de Noël et conservation de la carotte.



Lâchers de *Diadromus pulchellus*, parasitoïdes de la teigne du poireau. Suivi et dépistage dans les poireaux et l'ail pour un projet en lien avec la lutte biologique.



Suivi des ennemis des cultures et soutien à l'agronome responsable du Réseau d'avertissement phytosanitaire (RAP) (carotte, choux, ail et poireau).

Apprentissages: participation à une variété d'essais sur le terrain permettant d'expérimenter différentes méthodes de recherche

Impacts positifs: développement de relations professionnelles avec des producteurs et des agronomes d'expérience

Adresse MAPAQ : 4260 Boul Bourque
bureau 1.10, Sherbrooke, QC J1N 2A5
Téléphone : (819) 820-3001

Policy Analyst and Program Coordinator

Natural Resources Canada (NRCAN) – Smart Grid Program

Christopher Booth – Bioresource Engineering undergraduate



Figure 1: Natural Resources Canada's national headquarters at 580 Booth St., Ottawa, ON.

Employer background:

Natural Resources Canada is a federal department involved in the sustainable management, development and use of Canada's natural resources, including energy, mining resources, forestry, etc.

Program background:

The Smart Grid Program is a federal funding program supporting utility-led grid modernization projects, particularly those facilitating the integration of distributed renewable energy resources into the existing electrical grid. It was approved under Budget 2017 to allocate \$100M over four years to support worthy projects demonstrating or deploying pre-commercial technologies.

Job description:

The Program Coordinator participates in all program activities, including:

- program and project management tasks;
 - completion of project risk assessments;
 - scheduling and organizing meetings;
 - maximizing program learning opportunities;
 - managing correspondence with program applicants;
- collaboration with CanmetENERGY research labs and other organizations on various reports;
- briefing other program managers, directors, etc.

Learning outcomes:

NRCAN exposed me to a wide variety of opportunities to develop skills and knowledge relating to:

- public policy;
- program administration;
- public-private relations;
- energy, innovation and other issues involving the electric power sector;
- proposal writing;
- project management and risk assessment, etc.



Figure 2: A news article describing the August 28 announcement of federal support (\$1.4M) to the ENMAX project implementing two-way power flow in Calgary's secondary network.

<https://www.cbc.ca/news/canada/calgary/green-energy-project-calgary-alberta-1.4801936>

Employment information:

- I was hired through a competitive application process under the Federal Student Work Experience Program (FSWEP).
- Once hired, I gained access to many career tools and it was easy to apply to other departments.
- The federal government provides strong long-term job security.

Contact information:

Christopher Booth
Christopher.booth@mail.mcgill.ca
Bioresource Engineering
undergraduate, McGill University





Reception and waiting area of the hospital

Internship Information

Company: Pet Cares Professional Veterinary Services
Location: Tai Po, Hong Kong
Supervisor: Dr. Patricia Shuen
Contact Email: petcareshk@gmail.com



Surgery suite and X-ray room

My Job Duties and Responsibilities:

- Assisting the veterinary surgeon in consultations and surgeries, such as:
 - Measuring the patient's body temperature and weight;
 - Taking blood and urine samples, and
 - Recording anesthetic chart



Handling and bonding with a cat patient
(Photo taken by Yansly Au)



Assisting the vet to collect blood samples of a mongrel dog patient

- Administering drugs and medications as instructed by the veterinary surgeon
- Performing laboratory tests
- Nursing care of hospitalized animals
- Cleaning and sanitizing cages and used surgical instruments
- Maintaining & filing records



A Shih Tzu came in with breathing problems (collapsed lungs). I was nursing the dog, to ensure it had sufficient oxygen supply. Also, monitoring its heart, respiratory and SpO2 (peripheral capillary oxygen saturation) rate.

What I learned:

- Common illness and diseases in cats and dogs
- Common vaccination and preventive care
- Identifying various symptoms of common diseases and illnesses of cats and dogs
- Understanding and analyzing blood and urine test results
- Performing different lab tests, such as complete blood count (CBC), blood serum biochemistry diagnostics, and urinalysis

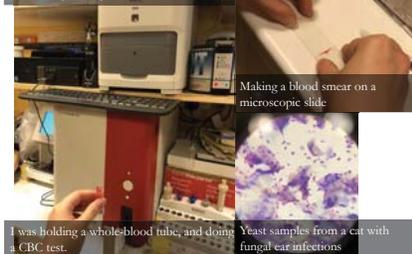


Bandaging and hanging up the dog's leg to prepare for Orthopedic surgery

2 Greatest Challenges:

1. To get the hang of handling and holding regular patients and sick animals skillfully and effectively
2. I have seen a lot of sick animals, sad and desperate owners, emergency cases and euthanasia cases
 - a. I was pushing myself not to express or "feel" any emotions because I thought it would be seen as unprofessional

Laboratory area: Blood Serum Diagnostic (top), and Complete Blood Count machines (bottom)



Making a blood smear on a microscopic slide

I was holding a whole-blood tube, and doing a CBC test.

Yeast samples from a cat with fungal ear infections

My Greatest Successes:

1. I was able to prepare the correspond vaccines accordingly, and understand thoroughly various laboratory tests
 - a. I could perform various blood tests on a professional front, and gained the trust from my colleagues
 - b. Therefore, I could perform these tests without supervision



Nursing a hospitalized dog. It wasn't eating due to the pain after surgery, and required force-feeding. I mixed the dog food with warm water and feed it with a syringe tube by squeezing the food into its mouth.

It was an excellent opportunity for me to further pursue the field of veterinary as I will have direct interaction with animals, and observe daily operation of a veterinary clinic. Also, to see if pursuing veterinary medicine suites me. This internship contributed to my studies as I was given a chance to perform laboratory measurements for patients, such as weight, blood tests, and identify risk factors, which I have been learning throughout the years but without actual hands-on practices.



A sweet and cuddly cat

Helpful Tips:

1. Be prepared to work under pressure because the workplace can be very stressful sometimes, and people around you may be frustrated or stressed at the same time
2. Be prepared to face several emergency cases and euthanasia cases
3. It is OKAY to be emotional and mentally stressed, but most importantly, you should find an appropriate way to release the stress and emotions

Project Engineer in SUEZ'S Diversification of Infrastructure and Environment Team



Job Description

I was part of the project support team inside the Diversification of Infrastructures and Environment branch. I was in charge of helping SUEZ's subsidiaries to respond to call for projects, which is a very multidisciplinary role. I have had tasks including developing business models, drawing engineering plans, defining contracts with contractors, building 3-D models of structures, consulting with equipment providers.



The CB21 Tower, home of SUEZ's headquarters located in La Défense, France's biggest business district

Contact Information:

Charles-Henri Poillot - charles-henri.poillot@suez.com
Hugo Liabeuf - hugo.liabeuf@mail.mcgill.ca



SUEZ's wastewater treatment plant located on top of the Mont-Valérien, just west of Paris, producing over 95 000 m³ of clean water per day, and serving over 600 000 inhabitants



Snapshot of the 3-D model of the metro station I have developed, including the technology used in the response to the call for project



The marina in Asnières-sur-Seine, where SUEZ is in charge of operations and construction works



ONSEN's Degrés Bleu Eau Chaude swimming pool heat exchangers



ENS Clean Air solution, particulate ionisation for low consumption air purification

What I've Learned

Evolving on multiple and very different projects simultaneously, gaining knowledge on subjects such as marinas, swimming pools and ventilation systems, working in a small team within a big structure to develop new competencies. Regardless of the work I have done, the team's goal and position within the company was very interesting because of the high flexibility the team had regarding what projects they responded to and how they respond to these projects. I have worked for many different people, and adaptability is a key skill to have, and I think it's something that I have really developed during this experience. Furthermore, because I was working on multiple projects at the same time, it was essential that I was proactive regarding the work I was submitting, always asking for feedback and proposing new ideas, showing that I could be of added-value to the work submitted, not simply executing the tasks assigned by my managers. I've also learned that the most important aspect of joining the workforce is to be people-orientated: having a large network of colleagues on which you can rely on for information and future opportunities is essential to evolve in an industry.

Learning outcomes

- Working simultaneously on very different projects
- Knowledge on air filtration systems, operation of marinas heat exchangers applied to swimming pools
- Constructing business models from scratch
- Market sizing and segmentation
- Identifying business growth strategies
- Understanding product launch strategy and determining market position

Successes

- Developed a complete business offer for a new product
- Help one of the subsidiary to surpass their yearly sales expectations by mid-July
- Submitted 2 call for projects in the span of 3 months
- Super fast integration to the team
- At the end of my internship, my manager was very happy with the work I had submitted and told me I had exceeded his expectations

Challenges

- Keeping up with all the project I was working on simultaneously
- Delivering quality work on time to different managers
- Working on subjects where I had no prior knowledge
- Having to work on a project where the 2 managers were contradicting one another's opinions and ideas

Summer Internship 2018

@ Wilkins Lab, Macdonald Campus of McGill University



Vincent McCarty
Undergraduate Researcher
vincent.mccarty@mail.mcgill.ca

Employer

Wilkins Lab

Olivia Wilkins, PhD
Principal Investigator
Assistant Professor
Department of Plant Science
McGill University
Raymond Building R02-20b
21,111 Lakeshore Road
Sainte-Anne-de-Bellevue, Quebec
H9X 3V9
Canada
(514) 398-8703

Internship Position

The summer internship involved working as an undergraduate researcher in the laboratory of Olivia Wilkins, PhD in the Department of Plant Science at the Macdonald Campus of McGill University. The Wilkins Lab is focused on plant genetics, with emphasis on exploring gene regulatory networks and their connection to the response of plants to abiotic stress.

The position involved working 35 hours per week from May 2018 to August 2018. The work was centered around a research project entitled "Reprogramming gene regulatory networks using CRISPR-Cas9", and was done in partnership with Phillip Rosenbaum, another researcher in the lab.

The internship position was funded by an Undergraduate Student Research Award (USRA) to myself, and by a Discovery Grant to Olivia Wilkins, both of which were provided by the Natural Sciences and Engineering Research Council of Canada (NSERC).

Project

The goal of the research project was to perform multiplex mutagenesis in using CRISPR-Cas9 to generate variation in the promoter region of the LAS gene, which encodes a transcription factor in *Arabidopsis thaliana*. Mutations in LAS are associated with decreased branching in aerial tissues. Successful mutagenesis would yield mutant plants with a range of branching phenotypes. Potential applications of multiplex mutagenesis include production of genetic variation to be used in the improvement of crops by plant breeders, and investigation of the connections between the components of gene regulatory networks.

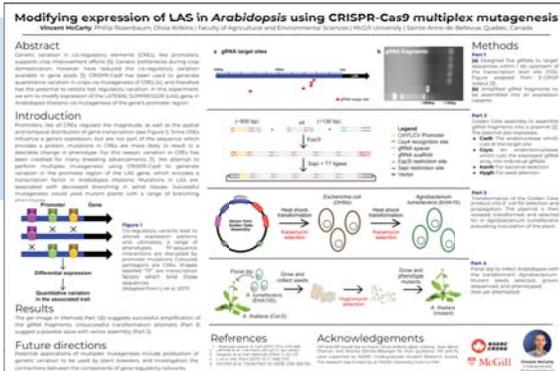


Image 1

A poster illustrating the research project which I produced for the FAES-USRA poster event in September 2018.

Photo credit: Vincent McCarty

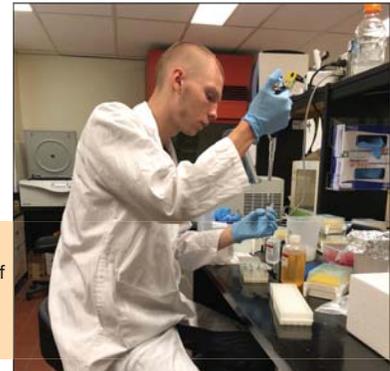


Image 2

The use of a micropipette as part of a PCR cleanup protocol.

Pictured: Vincent McCarty
Photo credit: Phillip Rosenbaum



Image 3

Arabidopsis thaliana, 28 days after seed germination, growing under controlled conditions in a walk-in growth chamber.

Photo credit: Vincent McCarty

Image 4

My work station in the Wilkins Lab, featuring an image of a gel to be analysed.

Photo credit: Vincent McCarty



Experience

This internship exposed me to important publications, scientists, and organizations in the fields of plant science and molecular biology. This increased familiarity key for understanding and communicating about the field in which I hope to build a career. I gained experience with tasks including PCR, transformation, running gels, designing primers using online tools, and reviewing literature. I also learned more about how to function in a professional lab environment, including forming habits which can at first be challenging to adopt. Among the successes of the internship was having the opportunity to present the research at an international conference.

Zoonotic Pathogen Sampling of Companion Animals in Andasibe-Mantadia National Park, Madagascar

LEMUR CONSERVATION

Identified as one of the world's top biodiversity hotspots, Madagascar is known to support a large population of endemic vertebrate species. Over recent years, Madagascar has captured a great deal of conservation attention, given that many species have become vulnerable to both human and nonhuman threats. Recently, the Mad Dog Initiative documented a spillover event of canine heartworm (*Dirofilaria immitis*) from dogs to critically endangered mouse lemurs. With an overpopulation of companion animals in the Andasibe region, understanding the zoonotic disease potential of companion animals on Madagascar's wildlife may be critical to protecting Madagascar's remarkable biodiversity.

Collaboration between the **Mad Dog Initiative** and **Travelling Animal Doctors** allowed for mobile spay-neuter-vaccination clinics to take place, while simultaneously studying zoonotic disease as measures of population control.

ABOUT THE PROJECT

During my internship, I was responsible for collecting zoonotic pathogen samples from free-roaming cats and dogs. The overall goals of this expedition were to collect blood, fecal, and ectoparasite samples, that would provide better insight into the types of pathogens spreading across Madagascar's wildlife. This will give us a better understanding of these diseases and their sources. We hope that our findings will also put emphasis on the importance of developing effective measures of dog-population control, and help address the need for conservation of Madagascar's endangered primates.

The team sets up the mobile clinic in Ampangatsary village, located in Andasibe-Mantadia National Park. (Photo taken by Stephanie Chan).

With up to 4 surgeries going on at once, as many as 30 animals a day receive free veterinary care. (Photo taken by Carmen Barba Claassens).



Dr. Tsiky and veterinary student Mabel performing a neuter. (Photo taken by Carmen Barba Claassens).

Researchers Stephanie and Mikhaela collecting samples in the field. (Photo taken by Carmen Barba Claassens).



Researchers Stephanie and Mikhaela working out of a van in one of the remote villages. (Photo taken by Carmen Barba Claassens).



An indri (*Indri indri*) resting in the trees in Andasibe-Mantadia National Park. (Photo taken by Rosa Ragni).



BENEFITS OF AN INTERNSHIP

Participating in an internship is fulfilling in so many ways. It is essentially a temporary job that allows you to learn, experiment, and discover the things you like and dislike when it comes to your career path. It gives the opportunity for students to ask lots of questions and gain hands on experience. It also gives you the chance to meet so many new people in your field and make connections that may be helpful in the long run.

Stephanie Chan
Stephanie.chan3@mail.mcgill.ca

For more information:

www.maddoginitiative.com



Comparison of HPS and LED Wavelengths on Tomato Growth

Department of Bioresource Engineering, McGill University, Macdonald Campus, 21111 Lakeshore, Ste-Anne-de-Bellevue, Québec, H9X 3V9

Samuel Eichhorn Bilodeau

Supervisor: Mark Lefsrud

Introduction:

Plant growth and development are in part controlled by light quality (color, wavelength), quantity (fluence rate), and photoperiod (duration of illumination). Combining these three parameters can strongly influence plant stature, growth habits, the transition to flowering, and end point plant productivity. LED lighting systems for horticultural use has become a viable consideration for their potential to reduce electrical energy inputs, making indoor crop production more cost efficient.

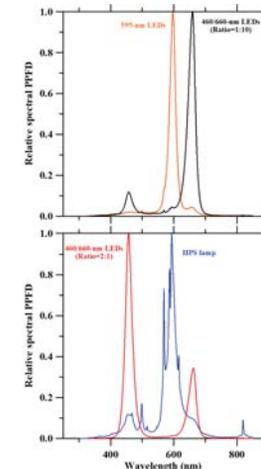
Experiment:

The objective is use a narrow-band wavelength to compare high pressure sodium (HPS) lights to 460nm/660nm at 1:2 ratio (blue and red), 660nm/460nm at 1:10 ratio (red and blue) and 595 nm as other sources of lighting for plant growth.

Materials and Method:

Four treatment levels was implemented in order to test the different LED wavelengths and intensities. Two ratios of red to blue light (10:1 and 1:2), amber LED and HPS lamp were tested. Each light treatment was repeated three times. Each light treatment had centroid wavelengths of 460, 595, 600 and 660 nm, for the blue, amber, red and HPS light respectively. Photosynthetically active radiation (PAR) and irradiance levels (Wm^{-2}) were measured using a light meter (LI-250A; LI-COR Inc., Lincoln, NE) with an underwater quantum sensor (LI-192, LI-COR Inc.) at each plant location to determine light maps of each section, at the beginning of the first experimental run, the end of the experimental run and once in between.

Source of Variation	SS	df	MS	F	P-value	Fcrit
Sample	35550.65	3.00	11850.22	7.25	0.00	2.70
Columns	903552.10	4.00	225888.03	138.20	0.00	2.46
Interaction	35223.87	12.00	2935.32	1.80	0.06	1.85
Within	163452.65	100.00	1634.53			
Total	1137779.27	119.00				



Results and Discussion

- Blue had the highest fresh weight
- Red had the highest Intensity
- Red had the highest number of flowers
- No significant difference between all lights for open flowers but Amber had the highest amount.
- Red had the most dry weight.
- There was a clear correlation between intensity and its beneficial effect.
- The experiment should have further analysed the discrepancies in intensity and its effect on photosynthesis.
- HPS had the lowest results for all parameters even though there was no significant difference between amber light and HPS.



McGill

RÉSERVE NATURELLE
GAULT
NATURE RESERVE

Myrah Graham: SPF Summer Intern
myrah.graham@mail.mcgill.ca

Employer: David Maneli
(david.maneli@mcgill.ca)

Work: Re-naturalizing disturbed trails on the Gault Nature Reserve. This entails studying the damage, re-greening the sides of trails and starting up a tree nursery.

I learned to do survey work and plant ID in the field. I hope to do more environmental work like this in the future. Asking questions about the natural landscape and answering them using our creativity was a great way to spend the summer.

All photographs from intern. Top left: Dieppe summit. Top right: re-naturalization sign asking people to stay on trails. Bottom left: boats used to do field work across lake. Bottom right: Surveying the disturbed trails.



 **McGill** FACULTY OF
Agricultural and
Environmental Sciences

 **OSAS** Office of Student
Academic Services
Macdonald Campus

info@shadesofhope.ca
(705) 437-4654



Chantal Coutu
chantal.coutu2@mail.mcgill.ca

Duties

Being an intern involves:

- Cleaning cages and enclosures
- Feeding the babies via syringe or tube
- Providing bowls of food and water
- Wound management and bandage changes
- Administering medications
- Physical therapy
- Miscellaneous tasks

What I Learned

Knowledge I acquired during this internship:

- General knowledge about animal care
- General knowledge about the life stages of various mammal and bird species
- General knowledge about all kinds of song birds, water birds and birds of prey
- Wound management and bandaging
- Medication calculation and administration
- Developed professional skills in a clinical setting



Syringe feeding a baby bird (taken by Ann Brokelman)



Baby skunk being syringe fed formula (taken by Ann Brokelman)



Top image: Me tube feeding a baby squirrel its formula (taken by Ann Brokelman)



Bottom image: Close-up of a baby squirrel being tube fed its formula (taken by Ann Brokelman)



Mallard ducklings keeping warm under a heat lamp (taken by myself)

Experience

Key words that encompass my time at the rehab:

- Educational
- Fun
- Busy
- Enriching
- Experience like none other
- Great team



Red squirrel learning to independently feed itself (taken by myself)

Opossum drinking its milk from a bowl (taken by myself)



Vegetables for life ! An introduction project to international solidarity

Helping a Cambodian agricultural Cooperative to generate more income through entrepreneurship.

Job description :

Three months in a remote and rural village in Cambodia with four other interns working with locals farmers in the cooperative on their organizational and administrative capacity through workshops, mentorship and conferences.



Take away : An exceptional opportunity to experience an intercultural exchange with a foster family, to learn new skills on the professional front working with NGOs and to learn about local vegetable marketing. I had the chance to use the knowledge I've acquired during my studies into a sustainable development project.



Contact Information:

Intern information : Nathalie Tran – nathalie.tran3@mail.mcgill.ca

Québec sans Frontières
<http://www.mrif.gouv.qc.ca//qsf/>

Développement et Paix (514) 257-8711

1425, boul. René-Lévesque Ouest, 3e étage
Montréal QC H3G 1T7

INTERSHIP AT THE CENTER FOR RESEARCH IN HEALTH IN LATIN AMERICA (CISeAL)

Contact me: diana.suarez2@mail.mcgill.ca / Employer's contact: jacostalesc@puce.edu.ec

INTRODUCING THE CISeAL

The CISeAL for its initials in Spanish (Centro de Investigación para la Salud en América Latina) is located near Quito in Ecuador and it was funded in 2000 as a collaboration between the Pontifical Catholic University of Ecuador (PUCE) and the Infectious and Tropical Disease Institute from University of Ohio. It is a collaborative space in Latin America, in which different scientific conceptions collide to build better health conditions.

The objective of this organization is to promote new research and educational opportunities related to infectious and chronic diseases in Ecuador and Latin America. The center seeks to implement their knowledge (scientific, socioeconomical, behavioral) in order to build better health conditions for people that have their wellbeing undermined by the presence of infectious and chronic disease.

CHAGAS DISEASE

Chagas is a neglected tropical disease found mainly in Latin American countries from Southern Argentina to Southern United States. According to the World Health Organization, 7 to 8 million people are estimated to be infected with *T. cruzi*, more than 25 million people are at risk of contracting the disease and over 10000 people die every year as a consequence of the clinical outcomes of Chagas.



Jalil Maiguashca working on a Portable Biological Safety Cabinets. Credit: Diana Suarez



Patricia Mora processing triatomines, vectors of the Chagas disease. Credit: Diana Suarez



Me doing extraction of the the intestinal content of the triatomine. Credit: Jalil Maiguashca



Christopher Garcia, observing samples of the intestinal content of the triatomine under the microscope. Credit: Diana Suarez

JOB DESCRIPTION

My role consisted in collaborating with researches conducted at the CISeAL on *Trypanosoma cruzi*, causative agent of the Chagas disease. I had the following tasks:

- Participation on an experiment that compares the virulence of different strains of *T. cruzi*
- Extraction of intestinal content of the triatomine, vector of the Chagas disease
- Observation of samples containing the intestinal content of the triatomine insect under the microscope and identification of positive samples
- Collaboration with DNA extraction of samples of *T. cruzi*
- Collaboration with freezing of samples of *T. cruzi*

MY EXPERIENCE

The experience at the center gave me the opportunity to growth professionally. I was able to acquire valuable experience and put in practice the different laboratory techniques that I had learn in my lectures at McGill such as PCR, electrophoresis and protein purification. In addition to that I learn how a study is conducted and I was able to participate in one. Also, I was able to observe different scientists and the way they work and solve problems.

My time at the center increased my interest in the efforts of organizations that seek solutions for infectious diseases. I realized of the importance of the work being at the CISeAL and the positive effects of their efforts on the communities. It was very inspiring to be able to work in a laboratory that is one of the first of it's kind in Latin America and that is committed to neglected populations.



Exploring Martian Lava Tubes as a Possible Biosignature Preservation Site

Christopher Patterson (Bioresource Engineering, U2, christopher.patterson@mail.mcgill.ca)

Supervisor: Dr. Richard Léveillé

Roll in ATiLT:

As a research assistant, my responsibilities encompassed a wide variety of facets within the project; sample collection and representing ATiLT with our partner agencies to name a few. My most major role, however, was to prepare a mission profile for the robotic exploration of lava tubes on Mars. Over the course of several months, I evaluated landing sites, wrote software to characterize local environments and conducted literature review on various spacecraft to create a documentation of how such a mission might be accomplished. My findings can now be found in the recently published article: "Exploring Martian Lava Tubes as a Possible Biosignature Preservation Site" within the Proceedings of the 69th International Astronautical Congress

Takeaways:

Over the course of my time at ATiLT, as one might imagine I've become very familiar with lava tubes and the potential refuge they offer. Whether they are protecting sensitive biosignatures like the ones we were searching for or housing a future settlement of humanity on another world, these extraordinary structures offer nearly unparalleled opportunity for exploration. Bioresource Engineers, being trained in a multitude of methods to understand and manipulate environments to their needs, are uniquely positioned to take advantage of these caves. Not only could we design systems to make the tubes habitable, but we could utilize various sensing technologies to search for and exploit the numerous resources contained within. It is my hope that I will use the lessons I've gained from my time investigating lava tubes both on and off Earth to be able to one day design the technology humanity will need to begin colonization of the solar system.

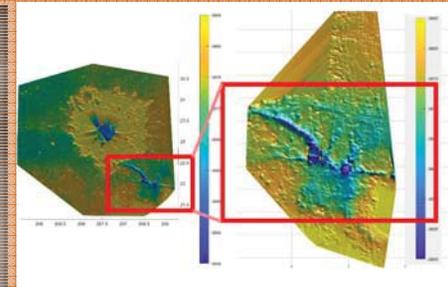
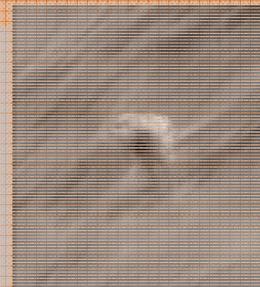
What we found:

After months of research, we were able to characterize several potentially viable landing sites for our proposed mission to Mars. Many of these are located in the Tharsis province of the planet, just East of Olympus Mons. The images you see are quite possibly entryways into the poorly understood Martian subsurface, and although they may only look like simple holes in the ground, the secrets they hide within may very well answer one of humanity's greatest questions: Are we alone in the universe?

Upper-left: A collapse into a cave on Mars

Upper-Right: Local topography of what seems to be a cave system with water flowing into it

Bottom: Yours-truly on the job (Cred: Arno Rogg)



INTERNSHIP IN ANAEROBIC WATER TREATMENT OF INDUSTRIAL WASTEWATER

RESEARCH AND DEVELOPMENT

THE PROJECT

Support of experimental set-up, operation, monitoring, maintenance, data logging and analysis of continuous pilot trials for the full-scale design projects as well as in R&D projects.



BIOBED® Advanced (EGSB) set-up treating pulp and paper wastewater.

- Tasks:
- Build the experimental set-up
 - Inoculate the two reactors with biomass and synthetic waste water (white wine)
 - Start monitoring
 - Look for difference in Ca precipitation



MEMTHANE® (AnMBR) set-up treating feta cheese waste water.

- Tasks:
- Continue another intern's trial
 - Recirculate more permeate instead of dosing caustic (-\$)
 - Operate at <pH in reactor
 - Look for changes in the effluent calcium



LEARNINGS

- Working in team is necessary and inevitable. I had to learn to work in a different way.
- You don't have to be scared to ask questions. It's normal not to know everything, everyone has to go through this phase when starting a new job.
- When looking at results, it's important to always compare with previous data. Values on their own are mean less.
- A lot about anaerobic water treatment



Measuring the gas composition while doing the daily operation



Fixing a leakage on the 2nd reactor of Biobed Advanced

CHALLENGES

- No prior knowledge about anaerobic water treatment
- Constant team work
- Teach to another intern after being only a short time on my own

EXPERIENCE

- Great international experience in the Netherlands
- Working with experts in anaerobic waste water
- Some techniques of analyzing data or Excel skills will be applied in the future



Canal in Delft, The Netherlands



BBQ at the lake with some coworkers



Social activity with everyone from work



Farewell "party"

WATER TECHNOLOGIES

CONTACT

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BIOTHANE, Delft, The Netherlands
Santiago Pachco-Ruiz, R&D
Manager
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BIOTHANE



Office of Student Academic Services
Macdonald Campus

Food Science & Nutrition

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Yijiang Liu, U2,

Summer Internship at Share the Warmth

(514) 933-5599

625 Fortune St., H3K 2R9



PARTAGEONS | SHARE THE
L'ESPOIR | WARMTH

WHERE WAS IT?

Share the Warmth is a community organization that works to fight hunger and poverty. Their mission is to achieve a better development of youth and more food-secure households.



Credit: Emily Balderston

WHAT DID I DO?

I assisted with the weekly inventory and the logistics of summer barbeques. I developed healthy, affordable, and diverse options for the café based on available ingredients.



Credit:
Yijiang Liu

I used Produce Transformation Protocol to preserve the large quantities of fruits and vegetables from donations. Developing popsicle recipes and producing jam were two most used methods.



Credit: Sabiha Begum



Credit: Sabiha Begum

WHAT DID I LEARN?

Four months of kitchen experience allowed me to gain some practical culinary skills. I also learned how to prioritize tasks through the day, as well as how to assign different things to people based on their abilities and strengths when my supervisor was away for three weeks.

Étudiante en Science de la Nutrition
Joannie.richer@mail.mcgill.ca



Ce que j'ai fait

Stagiaire Recherche et Développement, Entomophagie

Description du poste

- Recherche et revue de littératures sur les besoins alimentaires et abiotiques des grillons domestiques (*Acheta domestica*) et des ténébrions meuniers (*Tenebrio molitor*)
- Recherche et revue de littératures concernant les avantages nutritifs et environnementaux de la consommation d'insectes.
- Suivi et analyse du développement et de la croissance des Ténébrions meuniers à des fins industrielles.
- Aide dans la recherche et développement du produit fini (poudre de grillons et poudre de ténébrions).

- Mise en place d'une méthodologie de travail pour le suivi des Ténébrions meuniers.
- Compilation d'études portant sur les besoins, les taux de croissances et les taux de rendements des Grillons et des Ténébrions.
- Monographie sur les valeurs nutritives de ces insectes et quelques éléments principaux (fer, acide-gras essentiels, potentiels allergènes).
- Aide pour les futurs étapes du développement de l'entreprise (évaluation sensorielle, transformation alimentaire et étiquetage).

Ce que j'ai appris

- Les insectes pourraient s'avérer une bonne alternative alimentaire afin de réduire l'empreinte écologique des pays industrialisés si l'élevage est fait dans une optique éco-responsable et durable.
- Le développement d'un nouveau produits est complexe et requière un sens de l'organisation pointu.

Matériel fréquemment utilisé pour les mesures et la classification des stades de ténébrions meuniers



Photos d'arrière plan : Nymphes (haut), larves (centre) et adultes (bas) ténébrions meuniers



Femelle *Acheta domestica*



Moi travaillant sur la recherche, l'analyse et l'organisation

Crédit pour toutes les photos du poster : Joannie Richer (moi)

Atouts mis en pratique et développés

- Démarche scientifique incluant méthodologie, prise de données et analyse de résultats.
- Critique de littératures scientifiques de façon concise et efficace.
- Connaissances sur les procédés de transformation alimentaire et d'évaluation sensorielle.
- Abréviation et la vulgarisation de recherches scientifiques et de notions académiques



Merci à Brenda Plant, Céline Comeau, Claude Girard et Yan Hébert
Cofondateurs D'Umamize / Tottem nutrition inc. (438) 929 2469

Pour plus d'information : <https://tottemnutrition.co/>

Understanding the impact of marine subsidy on the Arctic terrestrial biome

By: Catherine Destrempe

catherine.destrempe@mail.mcgill.ca

A description of my internship

My internship was separated into 3 different experiences. First, I went to Moncton University, where I did some administrative work and helped to organize field material for the Kouchibouguac and Igloolik studies.



Photo credit: Mia Courville-Todorov
Description: Focal perform with a telescope on a group of birds.

Second, I had the chance to go to Kouchibouguac's National Park, where I started ,with my colleague Mia, a research project. We studied the impact of the consumption of Soft-shell clam by Canada Geese.

Finally, I had the great opportunity to go to Igloolik Island, in the Arctic, where I pursued my personal project. There, I looked at the impact of marine subsidies on terrestrial ecosystems by collecting samples of arthropods from different trap. In these traps, I performed multiple shorebird behavioural observations. Additionally, I helped my colleague with other protocols; like lemming lives trapping, nest searching, bird capture, etc.



Photo credit: Sylvain Christin
Description: Nest searching using the rope drag technique.

Learning and skill gain during my internship

I learned a great deal from this field experience. I discovered how to organize projects and what kind of office work is needed for their completion. Furthermore, I learned how to effectively work with a team in the field. Additionally, I gained a lot of experience by manipulating small mammals and by following the rigorous step needed for their safe capture. However, one of my greatest learning



Photo credit: Marion Guillot
Description: Release of a lemming in the live-trapping project.

this summer was how to deal with mistakes or complications during the realization of my field study. I truly believe that the problem-solving skills that I learned, during this internship, will be a tool which I will use again in my future career.

Employer

Marie-Andrée Giroux
marie-andree.giroux@umoncton.ca



Photo credit: Audrey Bédard
Description: Algae sampling using quadrat.

Acknowledgment

I would like to thank the Igloolik and Kouchibouguac team that made this summer unforgettable and helped me in so many ways to improve my skills and knowledge in this field of study.

A special thank you to Marie-Andrée Giroux, my supervisor in this internship, for this experience and the great opportunities she gave me all summer long.



FACULTY OF
Agricultural and
Environmental Sciences

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FACULTY OF
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Environmental Sciences



Office of Student
Academic Services
Macdonald Campus

Research Laboratory assistant Internship:

Application of Biochar-amended Biosand Filter in Removal of *Escherichia coli* from Lakewater

Learning Experience

This internship opened me to a lot of terms and concepts in the field of environment and how we can use our natural resources to build something impactful. I have gained an enriching experience where I got to learn a lot about laboratory work as well as learning new instruments and ideas.



Biofilter columns with their corresponding jar to collect the filtrated water
Credit: Shi-Jia Tran

Internship Description

Assisting a graduate student in his research project. Different tasks include helping in the set up of the biofilter system, culturing and inoculating *E.coli* and testing the concentration of bacteria.



Shi-Jia washing the sand with tap water
Credit: Peining Guan



1L of lake water samples pumping into each column and water pump on the right
Credit: Shi-Jia Tran



Shi-Jia sieving the sand using the sieving machine
Credit: Peining Guan

Contact Information

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Environmental Summer Student

The Biodiversity Team

Teck



Standing in front of Elkview mine pit
Photo credit: Kendra Gray



Supervising tree planters at Mine
Photo credit: Cael Geier



Standing on summit of Three Sisters Mountain
Photo credit: Stuart Perfect

Working with Environmental Coordinators to reclaim Teck coal mine-sites

Job Description: Four months of work based out of Sparwood in the Elk valley. Includes office work and field work at five coal mines located in the area. Building, awarding, organizing and supervising contracts relevant to the environmental reclamation efforts across the region (tree planting, invasive plant control, fish & herptile salvages, and greenhouse management).

Take Away: Incredible experience from which there was much knowledge & experience to gain. The variety of work gave much perspective into coal mine operations and what environmental efforts are required to sustain operations. Learned many soft skills such as courageous safety leadership, contractor management, interpersonal communication and presenting. This job is located in an amazing area of BC where evenings and weekends are filled with exciting outdoor activities.



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Shaping a more livable world.

Development Alternatives Incorporated (DAI) is a private development company based in Bethesda, Maryland, with additional corporate offices in London and Hemel Hempstead in the United Kingdom.

United States (Washington D.C.) Tel: 301-771-7600

Europe (United Kingdom) Tel: +44 (0)1442 202400



Livio Caputo Environment and Energy Intern livio.caputo@mail.mcgill.ca

This past summer I worked in the Technical Services Department of the Renewable Energy Sector at DAI. During my time at DAI I assisted on numerous different projects, for example:

- Co-authored a paper for trade publication on distributed renewable energy generation in both developed and undeveloped nations.
Organized a monthly panel open to anyone internally and externally to discuss new renewable energy technologies that could be applied in the development field.
Completed training on proposal writing and acted as the Proposal Coordinator for USAID solicitations.

Role: Acted as Proposal Coordinator for the Power Africa Beyond the Grid Solicitation.

The Beyond The Grid (BTG) Framework is a new sub initiative focused exclusively on unlocking and growth small-scale on the African continent. Beyond the Grid has partnered with over 40 investors that have committed to invest over \$1 billion into off-grid and small-scale solutions to this market.

POWER AFRICA



Role: Co-Authored a paper titled Community Acceptance of Distributed Renewable Energy: An innovative approach to be published in the Georgetown University Scientific Journal.

Summary: The paper explores the potential of ownership on community acceptance of distributed renewable energy generation in developing countries. This is not a study of mini-grids providing electricity exclusively to a local community but rather plants connected to the main grid. Analyzing data from current and past DAI or USAID renewable energy related projects, I illustrated an innovative local ownership scheme while touching on both the policy and technical sides of the problem at hand.





Treat variations Credit: Carolyn Chin

About the company:

Wilder Harrier is changing the way owners feed their pets. Through disruptive thinking, the WH team innovates by using sustainable proteins and upcycled ingredients to offer high quality nutrition and a reduced carbon footprint. We strive to have a social impact in our community and to inspire others to change the world.



Pictured: Carolyn Chin at Diana Pet Food performing coating trials Credit: Mandy Jian

WILDER HARRIER



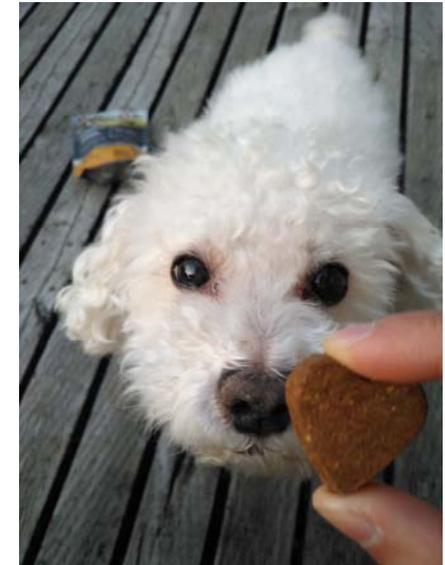
Pictured: Mandy Jian mixing dog treat dough at the Macdonald Campus Credit: Charlotte Giguère

My experience:

My internship with Wilder Harrier provided first-hand experience in a fast-paced startup where I became familiar with the wants of dog owners. I learned about the evolving dog food market, more specifically, how dog kibble is coated for optimal palatability. I also researched the nutritional properties of brewers' spent grain as an upcycled nutrient.

A word of advice:

Wilder Harrier is a dynamic environment where your opinion and work has a direct impact on the happenings of the company. Be ready to tackle all sorts of challenges and make a difference in the pet food industry.



Feeding Butters WH treats Credit: Carolyn Chin

Job Description:

I was responsible for the research and validation of novel ingredients. I performed kitchen trials to optimize existing products, analyzed survey data for market trends, and visited copackers and production plants.

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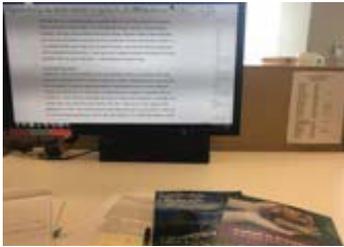
Paul Shenouda
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Summer Internship at the San Francisco Public Utilities Commission

Research with the Resource Recovery Team

Independent Project: Economic Benefit of Biosolids Use in Agriculture: *quantifying the increases in crop yield, and reduction in synthetic fertilizer use with recommendations for best practices*



Position: "Public Service Aide"(9922)
 My role: Gathering research and preparing reports for upper management. My work involved summarizing literature reviews to help inform policy makers, data analysis of lab reports, and some community outreach. This role was heavily involved in research.



These photos were taken on a tour of the Oceanside Treatment facility that processes and treats wastewater before it is sent into the bay. (Above & Below)



Before and after photos using biosolids as a soil amendment at a field in Solano County. The height of the forage grass was much higher in the 'after' picture. (Scheswohl, R.)



I learned how to create an economic assessment and use scientific data from literature reviews to create an Excel calculator that can be used for future economic valuations. This showed me how I can apply my degree in Agricultural & Environmental Sciences (Renewable Resource Management), and my minor in Economics in the workplace. This summer made me start to consider a career in sustainable land management.



Field day to visit the soil testing site and see different soil blends using biosolids with other organic material. (Left)



Contact: reine.donnestad@mail.mcgill.ca or check out careers at www.sfwater.org for more information



The Cape Wildlife Center

Creating Second Chances for Wildlife



Mission: To preserve the rich natural history of Cape Cod and the islands, one animal – and one person at a time.

Job Description: At The CWC your role is to assist staff in the general care and medical treatment of our injured and orphaned animals. This involves diet preparation, cleaning, administering medication, blood analysis, creating enrichment and more.



An Eastern Box Turtle undergoing surgery for for a carapace and bridge fracture.

Photos Taken By:
Jason Ninness



Administering anesthesia during a Snowy Owl bandage change.
Photo Taken By: Robyn Rohm

What I Learned: Throughout the internship I developed valuable skills such as:

- Administering medication including anesthesia
- Taking radiographs and blood samples
- The proper handling of animals including raptors and rabies vector species

I also learned about the anatomy of birds and reptiles, specifically how they differ from mammals.

The Take-Away: The skills I developed during this internship along with the lasting relationships that were created made this experience invaluable.

(Right) Raccoons bobbing for strawberries during enrichment. (Below) Newborn Virginia Opossums waiting to be tube fed.



Photos Taken By:
Jason Ninness



Contact Information:

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INTERNSHIP IN MICROBIOLOGY APPLIED TO VEGETABLE PRODUCTION

Fred Tremblay (frederique.tremblay@mail.mcgill.ca)

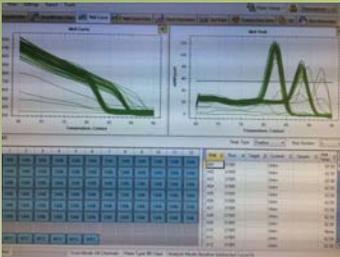
Supervisor: Hervé Van der Heyden (hvanderheyden@phytodata.ca) Co-supervisor: Prof. J-B Charron

Work Description

The work I did this summer is separated in two parts. My internship was with a company called Phytodata inc. and I was also working in collaboration with McGill university.

First part:

I started the internship at McGill university. During my time there, I learned various molecular techniques. However, my training was mostly focussed on real-time PCR (qPCR).



Typical results that I would obtain from doing real-time qPCR. This technique was used either to determine if there was expression of a specific gene or in order to quantify sporulation.

Field work was definitely one of my favorite parts. Either when it was for sampling onion fields or to give a hand to others for setting experimental field areas. I really enjoyed it because it allowed me to be outside and see the direct applications of our work. It gave me a good view of a possible job outcome in my field.

Second part:

This is where I went to Phytodata inc. There, I learned to do field work. I mostly did field sampling and experimental parcels set up. From the samples that were collected in the field, either the pathogens were isolated to study or the spores were analysed by real-time PCR.



When collecting samples in the field, the samples were observed with a dissecting microscope. The purpose of that is to see if there are any fruiting bodies of fungi and identify the fungi. This is the type of fruiting body that we would typically observe.



Field sampling in a huge onion field versus collecting tissue samples in a controlled environment in a laboratory. I got to learn the pros and cons of these two really different environments.

What I have learned...

I had the chance to practice various molecular biology techniques. I also learned to do field sampling and to set up experimental field areas. Working in an industrial environment was also a really different experience than what I was used to. I also had the opportunity to participate at a conference in my field and meet many professionals in that field. But the most important thing I learned is that, in research, it never goes as planned!

Internship at the McGill Institute for Global Food Security

The McGill Institute for Global Food Security



The McGill Institute for Global Food Security was founded in 2010 to create a facility that fosters passionate staff and students to work together on solutions to fight hunger around the world with research at the center of its focus.

It is located within the McGill Centre for Indigenous Peoples' Nutrition and Environment (CINE) building in the Faculty of Agricultural and Environmental Sciences at the Macdonald campus.



Image 1. Dr. Melgar-Quinonez's Lab Group

Tasks as the President of the McGill Global Food Security Club

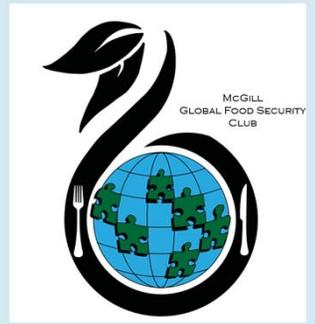


Image 2. New Logo

- ❖ Assigned to revive and revamp the Club
- ❖ Rewrote the Constitution
- ❖ Designed a new logo to represent the 4 pillars of food security
- ❖ Recruited new members to form a committee of students across both the Macdonald and Downtown campuses
- ❖ Organized initiatives for the Macdonald community

Christine Ha

Initiatives

- ❖ Christmas Drive for the West Island Mission & Sun Youth Organization (received \$500 funding from the Macdonald Campus Students' Society)
- ❖ Created the "Phoenix Fund" with the Vietnamese *Thoi Bao* newspaper for Vietnam relief efforts (raised ~\$15,000)
- ❖ The We Are Aware: *Montreal* Exhibition (raised \$1,012.75)
- ❖ Bi-monthly sandwich runs for people experiencing homelessness in Montreal (received \$1,000 funding from the Students' Society of McGill University)
- ❖ Volunteering at the Welcome Hall Mission
- ❖ The Sustainable Development Goals (SDGs) Awareness Campaign (raised \$1,351.50)
- ❖ Nutrition & SDGs Awareness workshops at Jeunesse Benny (received \$500 J.B. funding)

The Mac Christmas Drive Initiative

In collaboration with MEDLIFE Mac, the Dietetics & Human Nutrition Undergraduate Society, Healthy McGill, McGill Laird Hall Residence and the Macdonald Campus Students' Society.



Image 3. Christmas Drive Set-up

Approximately 400 brand new bed sheets & pillow cases, clothing, 300-400 tampons-pads-deodorant-razors, books, etc. were donated to the Sun Youth Organization.

The non-perishable food items collected were donated to the West Island Mission.

The We Are Aware: Montreal Exhibition

It is important to address and support the food security-related issues faced by people experiencing homelessness in Montreal.

Our efforts were to help raise awareness about the prevalence of homelessness that continues to persist in Montreal, and to break the stigma through their stories that we have collected with permission to share.



Image 4. Sample exhibition poster of Lucy and Vince

The SDGs Awareness Campaign Pictures



Kendra Gray The Dean's Office Dr. Treena Dolormier Dr. Caroline Beggs Dr. Timothy Johns Dr. Jim Fyles Dr. Hugo Melgar-Quinonez Christine Gurekian

Acknowledgements

- ❖ Dr. Hugo Melgar-Quinonez (hugo.melgar-quinonez@mcgill.ca): employer/supervisor
- ❖ Sonia Perillat-Amedee: Vice President of the McGill Global Food Security Club
- ❖ The 20 members of the McGill Global Food Security Club
- ❖ Association Canadienne pour les Nations Unies (ACNU)
- ❖ Kendra Gray: Internships Officer

Summer Environmental Technician

The summer environmental technician oversees all data collection in the field and provides the environmental coordinators necessary information for maintaining compliance with environmental regulations. The position provides valuable experience to environment related degrees wanting to be outdoors and monitor the environmental indicators first hand. You will learn the federal and territorial regulations through implementing strategies to educate all departments and monitoring general compliance of all employees.



Map indicating the Mary River mine site (baffinland.com)

Project info

Baffinland iron mines corporation is a very young operation near Pond Inlet Nunavut on Baffin Island. The mine produces high grade iron ore from a deposit 100km inland. The deposit is found throughout the Nuluvjaak mountain and was discovered due to the strong magnetic field created by the iron. The entire site is built on Inuit owned land in agreement with the Qikiqtani Inuit association and Nunavut Tunngavik Incorporated. Which ensure the policies created under the Nunavut Land Claims Agreement are carried out. The mine is therefore in constant exchange with the local towns to ensure value is received in exchange for development.

The Site

The mine operations are divided into extraction at Mary River and transportation. The iron is extracted from open pit style benches and transported by CAT 777 to crushing equipment at the base of the mountain. The consumer grade ore is then transported via B-train road trucks 100km to Milne Inlet. There it is stockpiled awaiting the short shipping season between mid July to mid October. The mine is built on records as the road and planned future railroad are pioneering feats of engineering for the arctic climate.

For career postings visit Baffinland.com
Or for further information on the position and information on valued skills,
find me on LinkedIn at Leo McGuire.



Complete Hydrology Data Collection



Weir equipped with electronic hydrology station

Experience Camp Life



Milne Port Weather haven kitchen

Digitizing notes + Environmental Strategy



Student Office Milne Port

Aquatic Effects Monitoring



Lake sampling for water quality (by Cameron Willson)

Water Treatment



Oily Water Separator Mary River

In-kind Support



Supplies for Tremblay outpost research camp

Plant Science Summer Internship

Job description

This summer, I worked as a lab assistant in the Plant Science department of the McGill MacDonald Campus. I was able to work with Dr. Olivia Wilkins in the Plant Systems Biology lab, as well for Dr. Danielle Donnelly.

Duties

As a member of the Wilkins lab, my duties were to assist with ongoing research projects involving gene regulatory networks, including plant circadian rhythm and poplar drought response. In the Donnelly lab, my duties were to assist in maintaining *in vitro* micropropagated potato accessions bred from excised graft junctions.

Techniques Learned

I was able to learn about molecular biology theory and techniques, including DNA/RNA extraction protocols, ATAC-seq for chromatin accessibility profiling, the quantification of gene expression using qPCR, grafting in an experimental greenhouse setting and in the lab using micropropagation techniques.

Learning Outcomes

This internship was valuable for me as I was able to act as a member of the Plant Science department and partake in ongoing research and the rigors of post-graduate education. With the present hope of continuing my studies after my Bachelor's degree, this insight into the breadth of work and possibilities has been very helpful.



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Office of Student
Academic Services
Macdonald Campus



McGill

VILLE DE MONTREAL 2018

Over the course of the summer, I interned with the Ville de Montréal as an ash tree inspector/field technician. In the context of the Emerald Ash Borer epidemic which has been ongoing on the island of Montreal since 2011, the overall objective of my internship was to help manage the ash tree treatment and tree felling subsidy programs set in place by the Ville de Montréal for private property owners. In tandem, these two subsidy programs aim to alleviate the financial cost of treating and felling ash trees for private property owners throughout the city and to foster collective action in the fight against the Emerald Ash Borer.

The most important responsibilities of my internship position included:

1. Ensuring the compliance and informational validity of ash tree treatment subsidy requests by evaluating the health, size, and geographical location of ash trees.
2. Ensuring the compliance and informational validity of ash tree felling subsidy requests by documenting the location of felled ash trees and the plantation of replacement trees on private properties.
3. Improving the inventory of ash trees located on private properties throughout the city of Montreal.

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H3C 0G4



a)



b)



c)



d)



e)



Ash Tree Treatment Inspections - Inspecting the treatment of ash trees on private properties occupied most of my time during my internship. The pictures of myself above demonstrate what the process of a typical inspection looks like (left to right). Each inspection involved a) making contact with the citizen if they were home b) obtaining the geographical location of the ash tree c) using a DBH measuring tape to determine the diameter of the tree d) verifying if the tree had treatment holes and e) evaluating the health of the ash tree by estimating its percent defoliation. (Photo Credits: Arnaud Fontaine-Dallaire)



Ash Tree Treatments - To reduce the impacts of the Emerald Ash Borer on the city's urban forest and tree canopy cover, the regulations set out by the Ville de Montréal require that all ash trees with less than 30% defoliation on public and private property be treated with TreeAzin (left), the only legally registered pesticide against this invasive species in Canada. Doing so prevents the larvae of this beetle (bottom left) from feeding underneath the bark on important vascular tissue, thereby, also preventing the creation of a network of tunnels (bottom right) that ultimately leads to the death of the tree. (Photo Credits: Cody Danaher).



To Treat or Not to Treat - Determining the percent defoliation of ash trees integrated my ecological/biological knowledge of trees gained at McGill with my internship responsibilities. Ash trees with less than 30% defoliation (top left) must be treated and are eligible for a treatment subsidy. Ash trees with more than 30% defoliation (top right) must be cut and are eligible for a tree felling subsidy according to the city's regulations. (Photo Credits: Cody Danaher).

A Dangerous Epidemic - Recognizing that the Emerald Ash Borer infestation and the death of ash trees in Montreal poses numerous ecological threats (bottom left) and threats to public security (bottom right), the application of my knowledge and skills in this internship brought me a great sense of accomplishment. (Photo Credits: Cody Danaher).



The Internship Experience - While conducting my inspections and taking inventory of the city's ash trees, I applied and refined many of the skills I have gained at McGill and through other work experiences. Driving skills, tree identification skills, skills associated with the use of ArcGIS, and communication skills were all very important in achieving my internship objectives. The car, iPad, and GPS I was provided with also demonstrate the level of responsibility required for this internship (Photo credit: Arnaud Fontaine-Dallaire).



Memorable Moments - Some of the most memorable moments during my internship were when I visited properties that had very old but thriving ash trees. Not only were the trees spectacular to see, hearing how much people appreciated them exemplified the ecosystem services trees provide. This ash tree (left and above) living in Pierrefonds-Roxboro, Montreal, is 89cm in diameter and has been there since the mid 1940s. It is currently being treated against the Emerald Ash Borer, and its location relative to the owner's house (above) is a great example of the shade provisioning service of trees in urban environments. (Photo credits: Cody Danaher)



Characterization of Canola Protein Based Superabsorbent Polymer Hydrogel

Introduction

Superabsorbent polymer hydrogels (SAP) are polymer networks that can absorb thousand of times their weight in water. These networks can be synthetic or bio-based in nature. Synthetic SAPs are generally synthesized from petroleum based chemicals and are traditionally used due to the fact that they offer rapid and high capacity swelling as well as stability. However, their poor biocompatibility and biodegradability can limit their applications. Bio-based SAPs can be made from either bio-based monomer or natural macromolecules, such as sugars and proteins. Bio-based SAPs are gaining in popularity due to their biocompatibility, non-toxicity and variation in physical properties. Due to these properties, bio-based hydrogels can be applied in fields such as agriculture, bio-medical engineering and soil remediation.

Photo Initiated Chemical Vapour Deposition (PICVD) is a surface modification technique that uses gases such as hydrogen and carbon monoxide as well as UV light to create a thin layer on the surface of a material. This layer can be hydrophilic or hydrophobic in nature depending on a variety of reaction conditions. PICVD is an interesting surface modification technique as it uses less energy than plasma modification and can be used on irregular surfaces.

Objectives

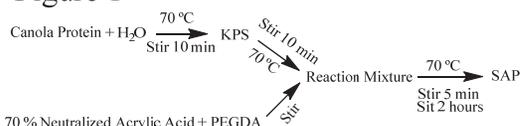
- Evaluate the physical properties of the Canola protein SAP and an acrylic acid control.
- Determine the effect of PICVD on the swelling kinetics.

Materials & Methods

1-SAP Preparation

The reactants in this synthesis include hydrolyzed Canola Protein, Polyethylene Glycol Di-Acrylate, Potassium Persulfate and 70% neutralized Acrylic Acid (AA). Figure 1 describes the synthesis process.

Figure 1



After the reaction was completed the gel obtained was immersed in ethanol for 30 minutes. The gel was then cut into pieces and immersed in ethanol for 24 hours. The ethanol was decanted and the gel was dried in an oven for 3 days before being crushed into a powder using a mill. The powder was swollen and dried until it reached a constant mass (3 swelling/drying cycles). The dried SAP was then re-crushed using a powder mill. The powder was then stored in a desiccator.

2-pH swelling and Reswelling Tests

The swelling ability of the canola SAP and an acrylic acid control were tested using the tea bag method with 50 mg of the sample in distilled water and solutions with a pHs of 2, 5, 8 and 11.

Reswelling tests were conducted using the tea bag method. The SAP was swollen for 24 hrs and then dried for 24 hours repeatedly until a significant drop in swelling capacity was observed.

3-PICVD Surface Modification Tests

The canola protein hydrogel was treated with PICVD to create a hydrophilic surface on the hydrogel powder. The hydrophilicity of the surface was tested using a water droplet test and the affect of the modification was tested using a swelling kinetics test.

4-Physical Properties of SAP

The gel content was measured using a sol fraction test.

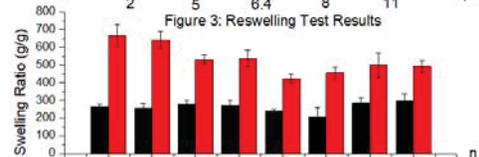
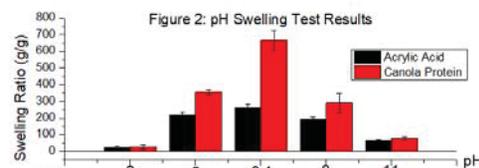
The thermal properties of the SAP were investigated using thermogravimetric analysis from temperatures of 25 to 800 °C with a temperature ramp of 5 °C/min.

The compressive strength of the canola protein SAP and a control acrylic acid SAP were investigated using an Instron with a 50 kN compressive head at 80 mm/min (dry samples) and a 500N crammer shear press at a speed of 80 mm/min (swollen samples).

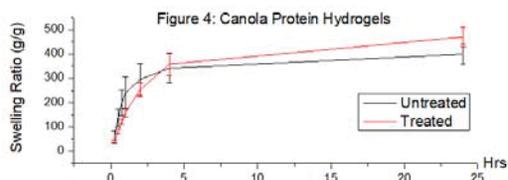
Results & Discussion

The gel content of the canola protein SAP was measured to be 35%. As seen in figure 2 the canola Protein SAP had the highest swelling ratio in the distilled water (pH 6.4) and the lowest swelling ratio at pH 2. This is due to the fact that at neutral pH carboxylate and sulphonate groups become ionized which breaks the

internal hydrogen bonds and allows the network to expand. At highly acidic or basic pHs these groups become protonated which aids in hydrogen bonding and shrinks the network.



As seen in figure 3, reswelling tests were performed using the finely powdered SAP. After 5 rounds of reswelling the SAP had reached 63% of its original swelling capacity. This is likely a result of the breakdown of the SAP network due to repeated swelling and drying.



As seen in figure 4, the canola protein SAP that was treated with PICVD had a slower swelling rate than the untreated canola SAP but had a higher final swelling ratio. The decrease in swelling kinetics was most likely due to the fact that the layer on the SAP is an extra barrier for the water to penetrate. This slightly slows down the swelling process. The increase in final swelling ability is not statistically significant and therefore there are very few conclusions that can be drawn from the test. However it is interesting to note that the standard deviation in the treated hydrogel test was lower than that of the untreated hydrogel. This suggests that the PICVD is able to offer a more consistent swelling rate.

As seen in figure 5, the canola protein curves (b and d) are much smoother. These networks are less rigid and absorb energy more efficiently. The dry canola SAP has a

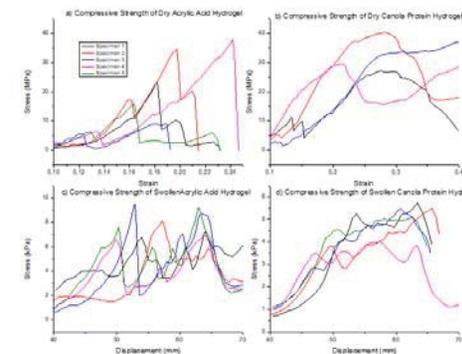


Figure 5: Compression Tests

compressive strength of 32 MPa versus that of 24 MPa for the dry Acrylic Acid SAP. The swollen AA SAP has a compressive strength of 7.5 kPa which is higher than that of the swollen canola protein SAP (5 kPa) however it broke apart into many pieces during the swelling process whereas the canola process SAP stayed in one piece. This suggests that the canola protein SAP forms a better network.

The degradation of canola protein and the optimized SAP were tested by the TGA. For canola protein, a sharp peak in the derivative of mass was detected at a temperature range of 250 to 350°C where as the SAP showed a series of small peaks from 200 to 400°C and a sharp peak from 400 to 500°C. The difference in thermal stability suggests that the canola protein has been converted into a SAP as it degrades at a different temperature.

Conclusion

- The SAP has the highest swelling capacity in distilled water and is reusable.
- PICVD does not significantly increase the swelling kinetics or final swelling ratio.
- Dry Canola SAP has a compressive strength of 32 MPa which is equivalent to the range of normal Portland cement concrete.

Acknowledgements

We would like to thank the Natural Sciences and Engineering Research Council of Canada (NSERC) for their financial support.

MISSIONS



Assist in implementing experimental protocols for five projects under the supervision of two McGill professors



Gather all the necessary data pertaining to the aforementioned experiments



Monitor experimental stages and determine in a collegial way the ideal time for data gathering



Prepare the physical data for further analysis



Literature research



Weekly presentation of the experiments' advances to the concerned professors



BENEFITS

Knowledge of good agricultural practices
Initiation to agrological research
Building lasting relationships within an international team



INTERSHIP AT SOIL AND WATER QUALITY LAB

SHUBHANKER JOSHI

ABOUT THE WORK PLACE:

Location: McGill's Macdonald campus under the supervision of Dr. Shiv Prasher (Bioresource Engineering).

Research Area: Reduction of soil and water contaminant uptake by crops; Studying emerging contaminants such as heavy metals, nanoparticles and hormones.

INTERSHIP EXPERIENCE:

Tasks: Assisting graduate students with their research projects. They were:

- Safe use of waste water in irrigation
- Uptake of nanoparticles by radish
- Increasing water usage efficiency

Learning experience: Hands on research experience; training in lab equipment use; learning soil and plant analysis procedures.

Challenges: No prior research experience; working on multiple projects at once.

Contact: shubhanker.joshi@mail.mcgill.ca



Figure 1: Preparing nanoparticle solutions



Figure 2: Measuring light absorbance by potato plant



Figure 3: measuring rate of photosynthesis using LI-COR



Figure 4: Applying fertilizers to pepper plants

Le Miccine Gaiole in Chianti, Italy

Kayla Dowd
kayla.dowd@mail.mcgill.ca

Employer:
Paula Papini Cook
lemiccine@gmail.com

Internship

This summer I joined Le Miccine's small dynamic team and assisted with tourism, winemaking, and general duties around the estate. I gained experience in organic agriculture and knowledge of sustainability and wine.

The barrel room,
where wine is aged



The Business

Le Miccine is an organic family owned vineyard dedicated to making high quality organic and traditional Chianti Classico wine. The business is run by Paula and Sabrina, two skilled winemaking women.

Personal Gain

- Experience working directly with sustainable agriculture and the enterprise around it
- Wine



Leading a tour



Assisting in the addition of sulfites



ABSTRACT

Cosmetic products such as sunscreen and plastic packaging products contain silver and zinc oxide nanoparticles respectively. These nanoparticles get into wastewater and accumulate in the soil. This can lead to potential risks in reducing plant growth. This experiment aims at analysing plant growth of carrots and green chilies.

INTRODUCTION

Nanoparticles can get toxic when entered in the human body through the food we consume. Therefore it is of utmost importance to be aware of the potential risks associated between plants and nanoparticles. Ten nanoparticles application were carried out over the whole experiment and several parameters were measured.

MATERIALS AND METHODOLOGY

The experiment was arranged using a completely randomised design. It consisted of three different treatments for each crop used and four replicates were considered for each treatment for a total of 24 experimental units.

Parameters that were used to analyse the effect of nanoparticles on the plants are:

- Chlorophyll content (SPAD)
- Photosynthetic activity (Li-Cor)
- Stomatal conductance (Li-Cor)
- Transpiration rate (Li-Cor)
- Crop vigor (Crop circle)
- Above ground biomass (scale)
- Moisture content (Oven)
- Leaf temperature (sensor)
- Plant height (meter rule)

RESULTS AND DISCUSSION

- For both carrots and green chilies, it has been observed that nanoparticles lower the chlorophyll content, crop vigor and photosynthetic activity.
- Above ground biomass was also found to be higher for controls compared to plants treated with nanoparticles.
- Moisture content and leaf temperature, noted over the course of nanoparticle application, remain unaltered.
- Plant height also was observed to be oppressed by the application of nanoparticles.

CONCLUSION

Both silver and zinc oxide nanoparticles do impede plant growth. It has been noticed that silver nanoparticles reduce plant growth more than zinc oxide nanoparticles do.

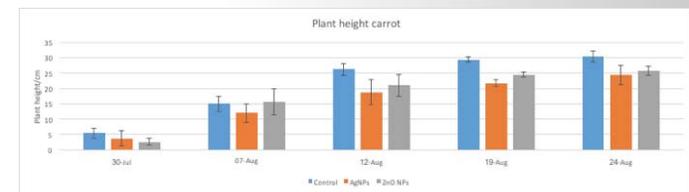


Figure 1. Effect of nanoparticles on plant height of carrots over whole experiment.



Figure 2. Using SPAD in the field.



Figure 3. Green chili plant control

Internship at the Advanced Multifunctional Multiphysics Material Laboratory



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Employer location:

Advanced Multifunctional
Multiphysics Material Laboratory



Macdonald Campus of McGill University
21111 Lakeshore Road
Sainte-Anne-de-Bellevue, QC

Employer profile

The Advanced Multifunctional Multiphysics Material Laboratory consists of several students from different engineering backgrounds performing research at the undergraduate and graduate levels. Under the guidance of Prof. Akbarzadeh, the team specializes in researching advanced materials and structures spanning mechanical, civil, biological, and electrical engineering applications. The terms *multifunctional* and *multiphysics* allude to a structure's capabilities of having multiple functions and utilizing multiple fields of physics, respectively. The materials that are investigated and prototyped could be used throughout the industries of energy generation, agriculture, health monitoring, and aerospace.

Projects & research

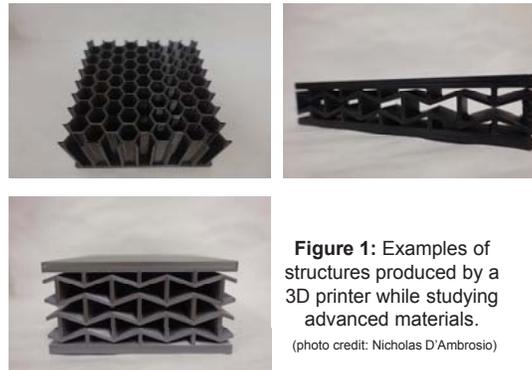


Figure 1: Examples of structures produced by a 3D printer while studying advanced materials.

(photo credit: Nicholas D'Ambrosio)

The types of research being performed in the Advanced Multifunctional Multiphysics Material Laboratory span multiple disciplines but all deal with advanced materials. This multidisciplinary approach provides an environment of collaboration and creativity among the members.

In the figures above, examples of this creativity can be found; prototypes of materials and objects are often 3D printed using fused deposition modelling. These materials are lighter and often stronger than conventional materials. This process allows the members of the lab to visualize and physically examine their work. This aspect of the work in the lab was personally fascinating as I had never experienced rapid prototyping such as this before.

My role

As an undergraduate student, my responsibilities in the AM³L varied significantly, which resulted in a dynamic and challenging workload. I was introduced to many advanced topics and concepts by collaborating on parts of larger ongoing graduate projects led by the other students in the lab. Concepts learned in previous courses, especially knowledge of software, proved useful in completing these tasks.

My responsibilities also extended to certain logistical tasks such as proofreading and editing upcoming publications as well as ordering equipment and materials for upcoming experiments. Being able to experience both the research-oriented and the management-oriented aspects of a research facility was a valuable learning experience in developing work ethic, time management, and collaborative skills.

Conclusion & Acknowledgements

I would like to acknowledge and thank the talented members of the Advanced Multifunctional Multiphysics Material Laboratory for their openness and dedication to creating a positive work environment. Special thanks to Dr. Akbarzadeh for his invaluable guidance and the opportunity to develop my skills as a researcher.