



Thames Valley Science & Engineering Fair 2019 Annual Report



Your 2019 Delegation to the Canada-Wide Science Fair

What is the Science and Engineering Fair?

Founded in 1970, the Thames Valley Science and Engineering Fair (TVSEF) is a volunteer run, registered charity dedicated to the promotion of project-based science inquiry among our youth. The annual fair is open to all grade 4-12 students from all schools: Public, Catholic, Private and Homeschooled in Oxford, Middlesex, Elgin and London. Our mission is to support, encourage & operate activities that promote the advancement of science and technology among students of all ages and abilities: to benefit both the educational systems and the community in general.

Looking forward to 2020

The 2020 fair will be our 50th anniversary! Come celebrate this milestone with us. It's a science fair, but also a party!

Success in 2019

The 2019 fair was another great success for the fair. Over 300 students participated over two days filled with exhibits and workshops. Grade 4-5 students learned important presentation skills in a non-competitive Friday evening exhibition, while grade 6-12 students were judged in the Saturday competition. Many students were selected from within their own school fairs prior to participating at the regional level. These students have worked hard, sometimes for months, generating and executing their own research programs. The fair weekend is not only an exhibition of youth science, students were also able to participate in fun workshops with our community partners. Finally, 10 winners were selected to represent TVSEF at the Canada-Wide Science Fair.

School Awards

Junior School Trophy: Orchard Park P.S.

Intermediate School Trophy: A.B. Lucas S.S.

Senior School Trophy: A.B. Lucas S.S.

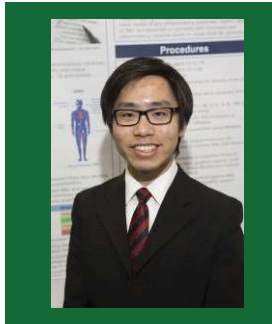
Teacher of the Year

Congratulations to Natashja Spenler, our Teacher of the Year, from Orchard Park Public School. Natashja received this award for her contributions to encouraging students to develop a science fair project and to pursue their interest in science.

Best in Fair

Tori Chen, a student at A.B. Lucas S.S., received "Best in Fair" for her project "Gene Therapy: A Treatment for Diabetic Cardiomyopathy".

Canada-Wide Science Fair Fredericton



Matthew Zhou

Effects Of BMI And SSRI Use On Inflammation In Adolescents With Mood Disorders.

Youth mental health disorders affect 1 in 5 children in Ontario alone. This project aims to identify markers of mood disorder progression in adolescents by investigating relationships between peripheral inflammation and clinical characteristics. The results of this study demonstrate the importance of monitoring BMI in psychiatric conditions to direct healthier lifestyle choices. In doing so, treatment plans for mood disorder patients can be better optimized. **Awards:** Silver Medal, University Scholarships: Dalhousie \$2500, New Brunswick \$2500, Ottawa \$2000, UBC \$2000, Western: \$2000

Shayan Mahmood

DeepWave: Cardiac Arrhythmia Diagnosis Using a Deep Learning ECG System.

Cardiovascular diseases are the leading cause of deaths worldwide. The electrocardiogram (ECG) is commonly used to measure the electrical activity of the heart. Manual interpretation of ECG signals is often prone to errors. DeepWave presents an efficient method for interpreting ECG signals to detect cardiac arrhythmias using a recurrent neural network. DeepWave predicts arrhythmias with 90% accuracy and identifies related arrhythmia classes with similar morphologies. **Awards:** Silver Medal; University Scholarship: Western \$2000



Luciana Tudor

Earth on Fire

Earth on Fire, is a project focused on forest fires and forest fire management. The primary goal was to conduct experiments that are as similar as possible to actual techniques used within the forest fire management industry and determine the most effective strategy.

Sarah Chun

Effect of COX-1 Inhibition on Tumour Organoids Using SC-560

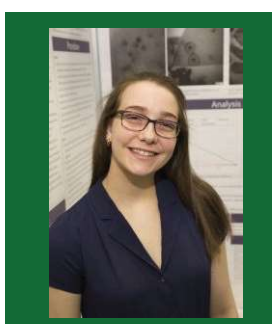
Cyclooxygenase (COX) is an enzyme that is responsible for formation of prostanoids. Some non-steroidal anti-inflammatory drugs (NSAIDs) have been shown to inhibit the growth of colon cancer cell lines. SC-560, an NSAID that selectively inhibits the COX-1 enzyme, is not currently used in humans. By testing SC-560 in-vitro, it will allow us to determine efficacy for potential use as treatment for patients with colitis-associated cancer. **Awards:** Silver Medal; University Scholarships: Dalhousie \$2500, New Brunswick \$2500, Ottawa \$2000, UBC \$2000, Western: \$2000



Áine Pucchio

A Pineapple a Day Keeps the Doctor Away – It's Not So Difficile

C.difficile infection (CDI) causes serious illness, prolonged hospital stays, and high hospital costs. In 2012, the USA had 500,000 cases of CDI, resulting in 29,000 deaths. C.difficile is easily transmittable and hard to disinfect, as alcohol-based hand rub does not kill it. By discovering a natural enzyme that can break down a C.difficile spore, I have developed a novel method for C.difficile disinfection. **Awards:** Bronze Medal; University Scholarships: Ottawa \$1000, Western \$1000





Anika Garg

Developing a Self-Sensing Actuator for Use in Wearable Rehabilitation Devices

This project examined the relationship between temperature, resistance, and strain in twisted and coiled soft actuators (TCA), made from silver-plated nylon fibre. This was done to develop a self-sensing mechanism for viable use of these artificial muscles in biomimetic systems such as robots and powered exoskeletons. **Awards:** Bronze Medal; University Scholarships: Ottawa \$1000, Western \$1000

Amal Aziz

Smart Photo-Active Trojan Horse Nanoparticle for Alzheimer's Vascular Therapy

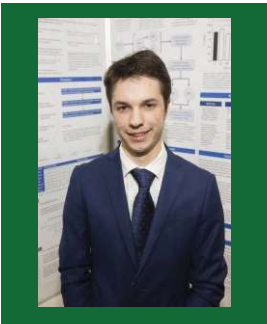
The major obstacle current neuroactive drugs face is their impaired penetration through the blood-brain barrier (BBB). Use of a novel photoactive drug that utilizes a Trojan horse as a BBB carrier could have significant clinical impact in reducing the active A β polymerization and increasing target specificity in deep-brain neurons in Alzheimer's patients' brains. **Awards:** Gold Medal; University Scholarships: Dalhousie \$5000 Manitoba \$5000, New Brunswick \$5000, Ottawa \$4000, UBC \$4000, Western: \$4000



James Iansavitchous

B-ALL Leukemia Treatment: Exploiting Dependency on ROS to Prevent Proliferation.

Investigation of genetic alterations in important antioxidant response and repair pathways in leukemic B-cells revealed a dependency in maintaining a state of oxidative stress. N-acetylcysteine effectively prevented rapid growth of the cells through reactive oxygen species scavenging, a safer mechanism than existing treatments. With established uses in the healthcare system, N-acetylcysteine can be efficiently repurposed for B-cell acute lymphoblastic leukemia treatment. **Awards:** Bronze Medal; University of Ottawa Undergraduate Research Scholarship Award; University Scholarships: Ottawa \$1000, Western \$1000



Etienne Joulin

Identification of Genetic Similarities between Parasites and Hosts Using CGR

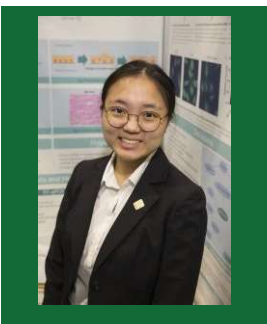
Chaos Game Representation (CGR) of DNA and frequencies (FCGR) aid in visually depicting genome sequence composition. Utilization of these tools and Spearman correlation graphs permitted the macroscopic and statistical identification of genetic similarities between 38 parasites and 49 hosts. This discovery highlights underlying co-evolutionary mechanisms in parasitology, which define the potential of new genetic approaches in effectively addressing the endemic issue of parasitic infections worldwide. **Awards:** Silver Medal ; Challenge Award – Discovery Intermediate; Statistical Society of Canada and Biostatistics Section Award Intermediate; University Scholarships: Dalhousie \$2500, New Brunswick \$2500, Ottawa \$2000, UBC \$2000, Western: \$2000



Tori Chen

Gene Therapy: A Treatment for Diabetic Cardiomyopathy

Diabetes affects 425 million people globally and is dangerous because it causes many illnesses, called diabetic complications; the most severe of which is diabetic cardiomyopathy, disease of the heart. Diabetic cardiomyopathy occurs when diabetes causes cell signalling errors in blood vessels of the heart. In my project, I used an up-and-coming cancer treatment (microRNA-9) to prevent diabetic cardiomyopathy. **Awards:** Gold Medal; Challenge Award – Health Senior; University Scholarships: Dalhousie \$5000 Manitoba \$5000, New Brunswick \$5000, Ottawa \$4000, UBC \$4000, Western: \$4000



Donors

It costs \$17,000 to run the regional science fair, and a further \$23,000 to send our maximum allotment of 10 students to the Canada-Wide Science Fair. To ensure that we can continue to offer this opportunity to local students, we invite you to join us as a sponsor. The participating students are our future leaders.

Please visit
www.tvsef.ca
 to learn more.

Email:
sponsorship@tvsef.ca



We invite you to become a donor to encourage and inspire the next generation of young scientists

Name & logo displayed on TVSEF website	Name & logo prominently displayed at the fair	Name & logo on marketing materials where applicable	Opportunity to have a display booth at the fair
Hydrogen \$5000+			
Helium \$2500-\$4999			
Lithium \$1000-\$2499			
Beryllium \$250-\$999			
Friend of the Fair \$1-\$249			

Hydrogen Donors will also be invited to:

Display a banner at the fair.
 Welcome attendees at awards ceremony.
 Invitation to attend Canada-Wide Orientation with students.

Tax receipts are issued for individual donations.

Charity Registration Number:
 891745044 RR0001.

Donations received within three weeks of the fair may not be acknowledged in the awards program and posters.



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