



# Frontenac, Lennox & Addington Science Fair

*Expo-sciences de Frontenac, Lennox & Addington*

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## Prefair Report

**2101**      **David Duggan, Abdullah Khan**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Water into ice (instantly)**

**Summary:**    Turning water into ice (Instantly)  
By Abdullah and David

First we fill the water bottle with tap or deionized water with 250 milliliters

Second add 1 teaspoon = 15 milliliter of table salts

Third put in the fridge for 2 hours and 45 minutes at -24 degrees

Fourth take out and hit the water bottle, the water bottle should turn into ice/slush.

Materials: water bottle, cooler, thermometer 250 milliliter of tap water and 250 milliliter of distilled deionized water

The fact that we are using that pure water has no nucleus in the cell

Materials: water bottle , cooler, thermometer, tap water, deionized water and table salt.

Our background question1: Can water turn to ice when applied with force

Background questions 2: why adding salt make the water colder/freeze

Purpose: Our investigation use two different type of water to see which freeze quickest at her procedure

Hypothesis: Our prediction is the distilled deionized water will freeze instantaneously at a sirtent temperature when there is a force applied . The tap water will not freeze well when the force is applied

In conclusion are exparament can work because if the water has no nucleus so the water can freeze well below the temperature normal water freeze at , the salt upsets the balance by replacing the water molecules ,called diffusion the more salt you add the colder the icy water gets.



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## Prefair Report

**2102 Matteo Bardana**

**Div/Cat Life and Earth / Junior**

**Title: Taking the Solute out of a Solvent to Solve the World's Water Crisis**

**Summary:** The purpose of my project was to find an energy efficient method that speeds up water purification in preparation for the upcoming water crisis due to global warming. I wanted to know how the amount of solute or suspended particles in water affects the speed at which it purifies using solar energy. My hypothesis was that a lower concentration of solutes or suspended particles in water would allow for a faster distillation process with the use of solar energy. I thought this because the more solute in a solution, the higher the density of that solution, and therefore, the higher the boiling point and the evaporation point.

The materials used included: metal bowls, jars, rocks, saran wrap, a bucket, Lake Ontario water, soil, scale, salinity refractometer, TDS Meter, water analysis testing strips, timer, sunlight, syringe, and volume measuring flasks.

The procedure involved collecting Lake Ontario water and placing 500mL of it into 11 different labelled metal bowls. I measured 5g, 10g, 18g, 90g, and 168g of salt and added them to the separate bowls. These amounts were chosen to represent different bodies of water (i.e. the Dead Sea = 168g/500mL). I matched these amounts with soil in other bowls. All the samples were tested for levels of chlorine, copper, nitrate, nitrite, pH, hardness, iron, salinity, total dissolved solids, and bacteria. An open glass jar was placed in each bowl. The bowls were sealed with saran wrap with a rock placed above the jar to make a slanted surface. The bowls were placed in a window. After 5 days, I retested all the collected samples for the same things as listed above. I then analyzed the results.

The pre-test results showed that Lake Ontario water had a high alkalinity (120 ppm) and pH (9). The TDS was 162ppm and the bacterial testing was positive. Adding soil to the Lake Ontario water decreased the alkalinity and the pH, and it increased the iron levels. All other testing remained constant with the soil added. The bacteria testing stayed positive. Adding salt to the Lake Ontario water decreased the alkalinity and pH levels, and increased the hardness. The bacterial testing became negative.

The post-test results showed that increasing the salinity decreased the volume of purified water. Increasing the muddiness also decreased the volume of purified water, but to a lesser degree than the salt. Therefore, the Lake Ontario water had the most purified water after. All other tests were negative.

In conclusion, my hypothesis was correct. The more solute or suspended particles in the water, the slower it purified. The Lake Ontario water purified the quickest because it had nothing added to it. I also discovered that increasing salinity decreased the effectiveness of the solar distiller more so than increasing soil. Therefore, the Dead Sea (168g of salt) was the slowest to purify out of all the samples. In the end, the solar water distiller purified all the water samples equally since all water quality tests and bacteria tests were negative.



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## Prefair Report

**2103**      **Faye Gilbert**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Static Clean**

**Summary:** Having clean air throughout your house is very important and useful to keep you breathing healthy. So ventilating the air by collecting dust, dry skin and hair using static electricity, the air would be purified and therefore improve breathing quality. This is important to have because for people with allergies to dander, dust and animal hair.

I designed a small box with a feather duster inside to collect common allergens using static electricity. The static electricity is created by having a powerful positive (+) charge rotating with an equally as powerful negative charge (-). By doing so, the static electricity charge attracts bits of dust, dry skin, dander and animal hair from the air and it collects around the box so it's easier to clean up.

The static electricity use friction to create sparks/crackling. You can see this action in real life as the form lightning or rubbing the sheets that you sleep in together. The charge between the box and dust, dry skin, animal hair and dander is not visible and travels through objects when the charges combine they separate. In conclusion, the static electricity vacuum is useful for purifying the air and keeping unwanted allergens from accumulating around the house.



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## Prefair Report

**2104**      **Jack Tang, Luke De Groot**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Les (pH)lantes : les pois et les haricots**

**Summary:** We will test to see if the pH content of water will effect the growth of beans. We are testing the pH levels of 5,6,7,8, and 9. We will record how high each plant will be, and we will print out the information that we have gathered from the 24 days we recorded, and we will present our learning on a poster, where we will explain what we learned, and how it could help in the future. The information will be presented in French. The procedures of how we did our project is as follows; we first decided to germinate the seeds for around 5 days, then, when we saw that the seeds were sprouting, we planted them in small pots, we would use acids to change the pH of the water we used, and use the different pH waters to water the plants. We would record our findings in a book where we would write down the height of the plant in centimeters for 24 days. On the poster, we will include an introduction, conclusion, our findings, our resources that we used along the way, and our procedure. We will also include the objective for our project and people who may find this research useful.



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## Prefair Report

**2105**      **Felicity Scrimshaw**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **How Road Washed Chemicals Effect Plant Growth**

**Summary:** My Science Fair project is about how Road Washed Chemicals effect plant growth in our city. I have germinated beans and grown them in different cups. I labeled all the cups with different chemicals, and put a measuring marks on each cup. Each cup has two beans in it. I have started each with just water then added the labeled chemical when I seen the sign of them sprouting. I made two different solutions, one with Road Salt, and one with Anti-Freeze. The solution with anti-freeze consist of 210mL of water and 40mL of anti-freeze. The solution with Road Salt consist of 250mL of water and 1tbs of Road Salt, with this mixture I had to use hot water to dissolve the Salt. I have used squeeze bottles to keep the solutions in, and they have measuring marks in the side of them, so it was easy to keep track of how much I was watering the beans by. The Salt that I used was SafTey Salt, and they anti-freeze that I used was S.T.P Anti-Freeze Premired 50/50. I used clear plastic cups and white paper towel. I have used mung beans because from the research that I have done it has shown me that they grow very fast.



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## Prefair Report

**2106**            **Sabrina Khan**

**Div/Cat**        **Life and Earth / Junior**

**Title:**            **How does laundry detergent affect flammability in clothing**

**Summary:**     In this experiment, I will be washing 3 different fabrics with 3 different detergents and testing the flammability of each. The fabrics I will be using are cotton, silk, and velvet, and the detergents are Tide, Gain, and a generic brand. I will be washing each fabric with the 3 detergents and burning them for 5 seconds each and I will repeat this for every single fabric. Then I will see the differences in each burned fabric and see physical characteristics that can differ them and why they were different. I will also be looking at the chemical components of each detergent and seeing what is the trigger for either more flammability or less flammability. I will also be looking at how it affects our human health as well as environmental health. For example, I will be looking at how the chemicals in the detergent effect how our environment is being affected as well as the respiratory and other issues that the chemicals in them could give us. Another thing I'll be looking at is what different companies put inside of their detergents, I will be looking at which companies care more about the environment and their health whereas some companies on getting clean clothes at any cost. Not only am I going to look at these things I'm also going to see how many people statistically are informed on what's inside their laundry detergent and, those who just buy based on the brand name.



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## Prefair Report

**2107**      **Zarin Tabassum**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Effects of Declining Biodiversity**

**Summary:**    Question/Hypothesis

What are the effects of declining biodiversity?

I know that biodiversity is a vital part in our lives. I think with the declination of biodiversity, animal and crop diversity will also decrease, creating a domino effect that affects the economy, health, etc. I think it will also affect our ecosystems. Our ecosystems are incredibly important to us, performing many tasks that we cannot. Biodiversity is about the diversity of life in habitats or ecosystems. Different animals and plants do different things and with less diversity the range of things an ecosystem can do will decrease. I think that with less biodiversity we will see change in the food chain and I think the quality of ecosystems may go down. There will probably be a change in agriculture as well. I know that we breed crops to produce better crops, therefore with less diverse crops we will have less opportunity to produce better crops.

Research Findings

For my project I have organised my work into different areas that loss of biodiversity is affecting. While researching I have classified my information to easily take in and understand my findings. I have found some graphs about the correlation between biodiversity and the quality of ecosystem.

In my research I have found that biodiversity plays a major role in crop diversity. Crop diversity is incredibly significant when concerning food security. For everyone to have safe, nutritious food at all times we need to have a diverse amount of crops. With more diverse crops we will be able to have crops that can withstand and grow in harsh conditions. Strong crops that are more resistant to pests, diseases, and can grow productivity will not need as much or any pesticides, leading to the less use of harmful pesticides. Crop diversity is the foundation of agriculture, helping evolve agriculture.

It was no surprise that the loss of biodiversity would have a huge impact on ecosystems, but just how much was a question. Ecosystems provide a number of tasks and services that we cannot. Some that I have learned are the nitrogen cycle, pollination, pest control, carbon sequestration, control climate, regulating disease along with others. The amount of diversity affects the productivity of the ecosystem and sustainability. A variety of plants and animals help with the efficiency of the ecosystem services.

Interpretation/Conclusions/Applications

While more in depth research needs to be done, from what I have researched I can now see the connections between biodiversity and many other things.



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Most of my hypothesis were true to some extent. I know that agriculture plays a large part in some countries economy, and since crop diversity is important in agriculture I can conclude that it will affect the economy. I notice that crop diversity can affect ecosystems and with better primary producers, the energy that is being transferred throughout the ecosystem becomes much better.





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## Prefair Report

**2108**      **Max Comber**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Finding The Best Natural way to Clean Up Oil Spills**

**Summary:** Hello. My name is Max. My project is to compare different natural methods to determine which will work best to up clean oil spills. Despite our best efforts, the world's dependence on oil is not going away any time soon. Canada recently spent billions of dollars to build a pipeline that will triple our capacity to move oil. All of this means our waters will continue to be at risk of oil spills, endangering our water supply and our many fragile marine ecosystems. The materials I will use will mostly be aquatic plants and other natural materials like hair and peat moss. I will attempt to determine if there are any cheap and efficient ways to clean up oils spills. The process for my tests may differ slightly, although the general theme will be to test the different materials on a tub of water, with oil on the surface. The oil that we will use will be engine oil, as it is the most similar to crude oil that is readily available. Now, I'd like to talk a little bit about why I chose this project. I chose this project because I have I great interest in marine life, and I would hate to see it be destroyed. It is extremely beautiful, and very important to life on Earth. I would also learn a lot. This is important, because I want to become a marine biologist when I am older. Anyway, I hope you enjoyed this summary of my project. I will see you at the science fair!



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## Prefair Report

**2109** Rachael MacBeth  
**Div/Cat** Life and Earth / Junior  
**Title:** Fertilizer Fun

**Summary:** My project is about natural and chemical fertilizers and their effect on the agricultural community and the environment around us. I chose this project because I want to discover if the rumours about chemical and natural fertilizers are true; that chemical fertilizers are better than natural fertilizers. I hope to learn which type of fertilizer is more efficient for the agriculture community and which fertilizers are the most environmentally friendly. My type of project is an experiment. I will be growing grass using a variety of fertilizers. The purpose of this experiment is to discover which fertilizers work best; natural fertilizer, chemical fertilizer, or no fertilizer at all. My independent variable will be the different types of fertilizer. My dependent variables will be the colour, height, density, and how fast the plant grows. My control variables are the plant type, soil type, temperature, and the amount of fertilizer, water and light. My hypothesis is that chemical fertilizers will help plants grow fast but will leave them in an unhealthy state. Further, I hypothesize that natural fertilizers will result in a longer growth period but will lead to healthier plants. My previous knowledge of chemical and natural fertilizers was limited. Prior to this experiment, I understood that chemical fertilizers were used more frequently but could cause water pollution, as well as being toxic to humans, animals, and the surrounding ecosystem. Natural fertilizers can be made out of plant, animal, or mineral sources. Plant-based fertilizers tend to break down fast, animal-based fertilizers add nitrogen to the soil, mineral-based fertilizers add nutrients to the soil. Natural fertilizers are easy to prepare. Natural fertilizers don't contain any harmful chemicals that lead to pollution of the water. The production of organic fertilizers can create employment opportunities. Natural fertilized food products are free of health risks. There are 4 different types of chemical fertilizers. Nitrogen fertilizers are made with extreme heat. Phosphate fertilizers are used on young plants. Potash is manufactured to develop strong roots. Sulphur is an essential component of proteins. Chemical fertilizers help plants grow, but they do not help the soil, the fertilizers kill the other nutrients. Due to the number of chemicals in chemical fertilizers, the plants can overgrow. Chemical fertilizers leach into water it increases the growth of algae, and the algae end up eating up all the oxygen. Chemical fertilizers can affect fetal brain development, a study shows that chemical fertilizers play a role in the development of the Blue Baby Syndrome. Chemical fertilizers add to the greenhouse gas effect. In my results the only plants that grew were the bone meal, the chicken fertilizer and just water plants, the other plant did nothing except for the Miracle-Gro fertilizer it created a fungus and did not grow any plants. I conclude that my hypothesis was wrong for the plants that did grow it took 3 weeks for them to grow, but the ones that didn't grow were the ones that I thought that would grow that fastest.



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## Prefair Report

**2110**      **Neville Klug, Jack Dejong**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Exploring The Threats to Microbiomes**

**Summary:**    In recent years scientists have been more and more interested in the human microbiome. What is the human microbiome exactly? Well, we rely on a large amount of microbes to stay alive, a microbiome that protects us against germs, breaks down food to release energy and to produce vitamins. For our science fair project we wanted to look at the microbiome to see if it is affected by hand sanitizer.

Our hypothesis is that we think that hand sanitizer will eliminate harmful bacteria but also eliminate the good bacteria making you more vulnerable to bad bacteria.

For our project we will be using petri dishes to sample five of our classmates' hands. We will then culture petri dishes at 98.6 degrees Celsius for 3-4 days, until the bacteria has grown. We will then observe for quantity, type and diversity of bacteria growing on the hands. We will then document our results. We will then use the same process with the petri dishes to sample the same 5 students from the previous sampling, but instead of sampling the hands on their own, the students will have applied hand sanitizer before we sample their hands. After the samples are done we will then use the same culturing process to grow any bacteria remaining on their hands. We will compare the two results and see how much bacteria the hand sanitizer had removed and if the hand sanitizer really works.

We will look forward to sharing our results at the science fair!



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## Prefair Report

2111      oliver clark

Div/Cat    Life and Earth / Junior

Title:      Are Dogs Affected by Music?

**Summary:** Me and Nick(my partner for this project) are going to be doing our project on how the effects of listening to music for dogs will affect their moods or behavior. We will be using 2 dogs for this experiment. Their names are Jack and Daisy, and their ages are 11 (Jack), and 8 (Daisy). daisy is a rescue dog from the Dominican republic so she might be unfamiliar with music. The music we will be playing is rock, pop, jazz, and classical. We'll be testing how long they eat their dinner, play fetch,and how long they sleep (before and after listening to music. We will also do this for eating their dinner.). We will play three songs for each category of music we will do. and we will judge their behavior with various tests (see above). We will have to play the music on headphones because if we use earbuds the dogs will be moving to quick to put them in so we have to use headphones. we (me and nick) will also be testing tricks with music on and see afterward if they do that trick without or with the music. we will be teaching tricks such as turning, speaking and dancing. we will be also giving the dogs a treat every time they do the trick since they will want another treat for doing that small trick. this project is just what most people wonder about but never actually test it so we are going to do that.the results are going to be judged on their emotions and their way of behaving their selves. it might be hard to play the music because both of the dogs are shy and might walk away while we are playing the music plus jack sleeps upstairs usually so we are probably going to do their tests separately



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## Prefair Report

**2113**      **Jacob Hansen**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Algae, the fuel of the future.**

**Summary:** My project Algae, the fuel of the future. is a research project about biofuels. biofuels are fuel such as ethanol, biodiesel and others. Made out of natural materials such as corn, wood, seeds, or algae. I chose algae to be the biofuel I would choose for my project because of its superior power to other biofuels and also of its overall ecofriendly ability. Unlike other biofuels (such as corn fuel and seed fuel) when algae fuel is created it creates food and fuel while the other biofuels (corn fuel and seed fuel) will take away food and create fuel. Also algae biofuels grow very quickly and will help to prevent the horrors caused by deforestation other than all biofuels made of wood. also algae biofuels have had a long history of costing too much to create but due to much experimentation and many innovations algae has now been reduced from costing over one hundred dollars a barrel to only a few dollars a barrel. at the moment there are only a few company's such as global Algae Innovations, AlgaeTec, Green Plains Renewable Energy,, working on making this dream a reality. And I think that if we all work together anything is possible.



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## Prefair Report

**2114**      **David Lai**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Which House-plant produces the most oxygen?**

**Summary:**    "Question: Which house-plant produces the most oxygen? (Tested plants: Aloe Vera, Fluffy Ruffle Fern, Croton, Prayer Plant) MORE ADD THEM IN

Hypothesis: The Prayer Plant will have the lowest amount of Carbon Dioxide by the end of the 3-day span compared to the other plants tested. I think this because it has the biggest leaves for the amount of equal area each plant takes up (We bought the plants all at equal size, and they ended at equal size)

### Materials

CO2 monitor (Plus charger)  
10 different plants  
Large plastic clear box  
Open camera app for Android phone  
Power bar  
Artificial light

Experimental Procedure: 10 different plants were tested to see which one is the most efficient house plant which will produce the most oxygen

Firstly, the plant was placed inside a clear plastic box with the CO2 monitor beside the box.

Next, a camera was set up to take a picture every hour starting from 1 hour after the plant was put in and until the plant is taken it out.

Then, set up an artificial light and the temperature to make sure all the experiments are under the same environment. The light is to be turned on at 8 AM and to be turned off at 8:00 PM

After that, The cracks on the plastic box has to be taped when closing the box, so air can't escape.

After 3 days of experimentation, the photos are transferred to Google Drive for me to extract the numbers to be inputted on a spreadsheet.

Finally, the plant is taken and the cycle repeats for other plants

Observations (These observations are made based on the graph of the data, which will be provided on the poster board at the science fair)

Every plant has a CO2 spike, with the exception of the Ruffle Fern, which is linear

All Plants have a somewhat changing axis, except the Ruffle Fern

All plants ended up having a lower amount of CO2 than when they started.

The Aloe Vera is the only one who had a big difference from the start.

The Aloe Vera is also the only plant to increase in CO2 at the very start

Both the Croton and the Prayer Plant hit the exactly 1400 PPM mark.



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## Conclusions

Currently, the results are still pending, but from the information currently provided, the hypothesis is proved correct. However, some of the untested plants could easily be the most productive one, so I cannot prove my hypothesis 100% yet.

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## Prefair Report

**2115**      **William Mcbratney**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Do Dogs Dream While Sleeping**

**Summary:**    What type of relationship exists between animals and dreaming?

- oe QUESTION / HYPOTHESIS

Nobody has proved whether or not animals dream, but I personally believe that they do, because they have extremely similar sleep cycles to humans. I talked with professional dog trainers, and they both believe that all animals can dream. They told me that they both strongly believe dogs dream.

- oe DESIGN / METHOD

I'm determining whether or not animals dream with information from documentaries, and advice from professionals. My information is only coming from reliable sites, like National Geographic, or from blogs by scientists who have studied this exact topic.

- oe OBSERVATIONS

I've observed many interesting facts of animal sleep, like the fact that during sleep, animals' brains function the exact same as they do when they're awake. Also, I found out that a scientist did a study on a cat's brain, where he numbed the part of the brain that kept the cat from moving while it was asleep, and the cat walked around, meowed, and even went into a defensive stance, all while the cat was fast asleep.

- oe INTERPRETATION / CONCLUSIONS / APPLICATIONS

I can conclude that animals dream, even though it has not yet been scientifically proven. All the information I've gathered has pushed me towards this conclusion, because logically, for example, a cat would not do all this if it were not dreaming about something. The study is currently NOT COMPLETE, but I have a large amount of it done.





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## Prefair Report

**2116**      **Jada Law, Abigail van der Plas**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Is What Your Holding Fresh or Molding?**

**Summary:** "We are doing a project we're we put mold into different climates, and see how long takes for the mold to form. We chose this project because we found that in grocery stores they waste a lot of bread (and a lot of other bakery type of item) because they are not stored in the right climate, so they go bad. We are trying to answer how does temperature and the climate and the type of bread affect the way Mold grows? And what is the best way to prevent Mold from growing? We did some research about what mold is and how it's formed, we found that mold is a type of fungus that grows in warm and humid environments. Molds reproduce when a spore lands on a moist surface. The type of mold most commonly found on food is called mycotoxins. We formed a hypothesis that the wonder bread in the room temperature climate with one spray of water will produce the most mold. We thought this because wonder bread has a lot of chemicals in it, therefore attracting the mold spores. We have both a independent variable and dependent variable. Our independent variable is Changing the climate the bread would be stored at, and we are also changing the type of bread we use. The dependent variable is the amount of mold the found on the bread. With this information we ran our first test. The first test was to put the wonder bread and the whole wheat bread in 3 different climates (room temperature, room temperature with one spray of water, and in the fridge). We conducted this experiment over 8 days, so we needed 24 pieces of wonder bread and 24 piece of whole wheat bread. We conducted the experiment and found that we didn't have enough information to make results/a final conclusion. We decided to run the test again, but this time we put the bread in two different climates (in a container sprayed once a day and in a container) and cut the bread into quarters. We ran this test until we found we had enough mold (15 days of testing). We found that we got a lot more information to help us and the bread moulded a lot quicker than our previous experiment. Right now we are in the process of collecting our results, formulating a conclusion, and organizing everything onto a presentation board.

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## Prefair Report

**2117**            **Henry Barber**  
**Div/Cat**        **Life and Earth / Junior**  
**Title:**           **It's Petri-fying**

**Summary:** In my project, I aim to find out what the most germ contaminated place in my school is. I am fascinated by this because it will inform me on what to avoid touching and maybe scare people into changing their habits (washing their hands for example). For my project I will be testing toilet flushers, door handles, old computer keyboards, old iPad home buttons, hand rails, light switches, the freezer in the staff room (it's moldy), the water fountain mouth and a kindergarten toy car (the teacher recommended it). I hypothesize that the toilet flusher will be the most germ contaminated place with the kindergarten toy car in close second. An article written by CBC cited that most commonly, the toilet flusher is the most germ contaminated place in the average Canadian house. The reason I think the kindergarten toy will be a close second is because I have been in the kindergarten room and there is a layer of germs EVERYWHERE, also the teacher recommended the toy car because of how filthy they are AND they don't get cleaned. To eliminate as many variables as possible, I will wear plastic gloves and swab the surface for 5 seconds (so there won't be more germs on one swab than the other). To inform/scare people further, I will attempt to diagnose the germ by comparing it to common household germ pictures. I will compare the samples by looking at the quantity of germ colonies and by researching the harmfulness of the colony. Thank you for reading this and I look forward to seeing you at the science fair.



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## Prefair Report

2118 Rizal Anderson

Div/Cat Life and Earth / Junior

Title: Les effets des rayons UVC sur la croissance bactérienne de l'Escherichia coli

Summary: "Durant les années, les scientifiques ont pu identifier les effets germicides des rayons ultraviolets sur la bactérie. Les longueurs d'onde spécifique pour ceci sont 240-280 nm. Ces longueurs d'onde sont situées dans le domaine des rayons UVC. Les rayons UVC sont absorbés par une double liaison pyrimidine (Thymine et Cytosine) dans l'ADN. Il permet d'ouvrir la liaison et de réagir avec les autres molécules. Ensuite, il cause des dimères de Thymine (des lésions moléculaires formées par la Thymine par des réactions photochimiques). Ceci perturbe gravement la structure d'ADN et la réplication d'ADN. L'ADN (acide désoxyribonucléique) contient toute l'information génétique pour qu'un organisme se développe. Lorsqu'il est endommagé, il peut causer des effets très sérieux sur la cellule. Quand ceci s'arrive, la bactérie va mourir. Donc, avec toutes ces réclamations, j'ai décidé de faire l'expérience moi-même. Mon but était d'analyser les effets des rayons ultraviolets (253.7 nm) sur la croissance bactérienne du baccile gram négatif : Escherichia coli. De plus, je voulais aussi voir comment la durée d'exposition pourrait influencer le nombre de colonies qui se produirait. Mon hypothèse est que les rayons ultraviolets auront réduit significativement la grandeur des colonies et que plus la durée d'exposition est longue, le moins de bactéries il restera.

Pour cette expérience, j'ai utilisé 9 boîtes de Pétri préparées avec la gélose nutritive, 3 écouvillons stériles, des lunettes protectrices offrant la protection contre les rayons UV, la lumière UVC (253.7 nm) germicide, une minuterie, feuille d'aluminium, thermomètre digital, cahier de laboratoire, marqueur permanent noir et un sarrau. En suivant la méthode donnée dans l'emballage, j'ai reconstitué la culture d'E. coli lyophilisée en utilisant la technique stérile appropriée. Après, j'ai divisé les boîtes de Pétri en trois groupes (Groupe 1, 2 et 3) ayant toutes des durées d'exposition aux rayons UVC différents. Par la suite, j'ai divisé les boîtes de Pétri en deux avec le marqueur permanent noir pour séparer le côté contrôle de la côté exposée. Après, j'ai utilisé les écouvillons pour mettre la culture d'E. coli sur toutes les boîtes de Pétri. Ensuite, j'ai appliqué la lumière UVC aux boîtes de Pétri avec les temps appropriés pour leur groupe. Ils étaient placés à 32-34°C. Après 26.5 heures, j'ai évalué les boîtes de Pétri.

Après 26.5 heures d'incubation, il avait une grande différence entre le côté contrôle et le côté exposé à la lumière germicide. Le nombre moyen de colonies crû du groupe 1 (côté exposé à la lumière UVC) était 15.67 colonies et le côté contrôle était 105 colonies. Le nombre moyen de colonies crû du groupe 2 du côté exposé à la lumière UVC était 3 colonies et le côté contrôle était 110. Le nombre moyen de colonies crû du groupe 3 du côté exposé est 0.33 colonies et le côté contrôle était 107. Donc, mon hypothèse était véridique, car le nombre de bactéries crû dans les boîtes de Pétri exposé à la lumière UVC ont resté inférieur au côté contrôle.

"



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## Prefair Report

**2119**      **Rhys Nicholson**  
**Div/Cat**    **Life and Earth / Junior**  
**Title:**      **Fanning the Flames**

**Summary:** "Abstract

### Purpose

The purpose of my study was to figure out which type of kindling most efficiently produced a fire. I used four different types of kindling: Paper, Doritos, pine needles, and leaves.

### Hypothesis

I hypothesized that paper would perform the best out of all four kindling types, due to its quick ignite speed and relatively slow burnout.

### Procedure

I began the experiment by setting up two trays, two dowels with a string, and a fire cage to hold the kindling. I then placed 8 sticks around the fire cage. I then lit the kindling and let it burn, timing the duration of time it took to burn the string in two. I then recorded some statistics about the fire and began again. This was repeated four times for each kindling.

### Conclusion

In my evaluated results, I found that the Doritos performed the most reliably, and although they took a while to ignite the string, they still lit it four out of four times. Paper performed second best, burning the string very quickly, although this happened only two out of four times. Pine needles performed just as well as paper, with 3/4 string burns, but its unpredictability and erratic patterns were detrimental to the fire. Leaves performed the worst, with only one string burn, and had a fast burnout along with high maintenance need.

### Discussion

The pine, paper and leaves all tended to burn very quickly but did not always light the wood or the string. This rapid pyrolysis may have been due to their more natural composition, compared to the Doritos. The Doritos' oils enhanced the ignition and prolonged the burning long enough to light the sticks and then burn through the string.

The pine and leaves both required some attention to flame enough to light the sticks, because of a mix of factors: air temperature (cold), quick ignition, and their light and thin structure, which meant they were rapidly consumed. The surrounding wood was not exposed to a consistent and hot enough flame to undergo pyrolysis.

Also, the structure of the kindling might have had effects on fire quality. The spaces between the kindling allow good oxygen flow, which is important to maintain burning. The Doritos were big and rigid, so there was lots of space between them, compared to the other materials. This extra flow may have helped the fire last long enough to light the sticks and then the string. The other kindling types were more tightly packed into the wire frame, resulting in less oxygen flow.

Overall, I believe that this project can help campers make better fires, with less frustration and ash piles. I personally hope you will walk away with better knowledge about fire.

"



# Frontenac, Lennox & Addington Science Fair

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## Prefair Report

**2120**            **David Hwang**  
**Div/Cat**        **Life and Earth / Junior**  
**Title:**            **Eggs are strong!**

**Summary:** My science fair is about eggshells. My question for the science fair is: How much weight can an eggshell hold under different circumstances (cooked, raw, wet, dry, cold, hot, room temp, soaked in salt water, orange juice, milk, and vinegar)? My hypothesis is that the egg that is cooked would not be as strong as the raw one, because when the egg is cooked, the particles in the eggshell vibrate so much, that the particles collide, wearing down the bonds of the particles. Eggshells in orange juice, vinegar, and salt water will also not be as strong, because the OJ, vinegar, and salt will slowly dissolve the eggshell. The water also weakens the eggshell-- but not dissolve it, so it will be weaker than the dry one. Milk doesn't have an effect on eggshells, because it does not contain an active ingredient to do so.

The way I will test this question is

- 1) Cook half (20) the eggs.
- 2) Put 4 eggs (two raw, two cooked for all the 4 eggs), in a fridge, 4 eggs in a hot place, 4 in room temperature, 4 in a cup of OJ, 4 in a cup of water, 4 in salt water, 4 in vinegar, and 4 in milk for a few minutes.
- 3) Crack the eggs, and remove the insides.
- 4) Arrange the eggshells to form the perimeter of the weight, and place the weight on.
- 5) Repeat with the others, and record the results.

OBSERVATIONS AND CONCLUSION IN PROGRESS



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## Prefair Report

**2121**      **Sophie Shen**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Fighting Escherichia coli with Herbs and Home Ingredients**

**Summary:** Back in November, an outbreak of pathogenic Escherichia coli O157: H7 spread across Canada, creating many infections in the intestines for many individuals. Due to antibiotic resistance of medications such as penicillin that developed in the past few decades, doctors may choose not to prescribe medication for minor cases of E. coli infection. This sparked an interest in me to discover which common herb or kitchen substance (garlic, oregano, vinegar, and tea tree oil), that are all believed to have antibacterial properties, is the most effective in inhibiting the growth of E. coli. I hypothesized that tea tree oil (containing high amounts of terpinen-4-ol, C<sub>10</sub>H<sub>18</sub>O) would be the most effective due to their existence in many toiletries and surface treatment products, the high amounts of terpinen-4-ol in the whole product (approximately 70%), and are widely by accepted to have antimicrobial properties.

Five experiments were conducted for tea tree oil, oregano oil, garlic, and water as control; live E. coli K-12 liquid cultures, a safe strain used as a "model organism", were swabbed onto 5 eosin methylene blue agar plates, which stains would stain the E. coli a metallic green sheen for better visual measurements later on. Then, three filter paper hole-punched circles where soaked in each of the substances, (tea tree oil, oregano oil, white vinegar, garlic juice, and water) were placed on the agar plates under a heat lamp in a completely dark box for 3 days.

My hypothesis was partially correct, as tea tree oil worked very well in inhibiting the growth of bacteria around the filter paper, the average of 14.33 mm in diameter including the diameter of the hole-punched circle (7.5 mm). But surprisingly, garlic juice came out as the most effective antibacterial agent, with the diameter of the inhibitions zone including hole-punched circle being an average of 16.33 mm.

With this knowledge of the antibacterial powers of garlic, future outbreaks of minor E. coli infections could be treated at home with chopped garlic (which produced the key antibacterial component, allicin). Allicin is proved by many other studies that it rarely leads to bacterial resistance and does not have major side effects on the body. Currently, garlic is becoming more and more popular as herbal medicine and may have a role as a common antibacterial medicine in the future. Dietary supplements of allicin are also gaining popularity, and according to my own research, they could help treat smaller cases E. coli infections.



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## Prefair Report

**2122 Allie Thurlby**

**Div/Cat Life and Earth / Junior**

**Title: Does the temperature of water affect the growth rate of a plant?**

**Summary:** "Question/Hypothesis:

I wanted to see if you could speed up a growing season by watering a plant with hot water and another with cold water. I hypothesize that the plants that I watered with hot water would grow faster because, plants need heat to grow giving it the extra heat I thought would make it grow faster. Plants also need the same heat coming in then out, evaporation usually takes heat out. I'm watering one plant with water that is 40 degrees celsius and one with water that is 5 °C, the particles in the warmer water are moving faster meaning it evaporates faster.

Design/Method:

8 bean seeds were planted in similar soil and in separate pots. The 8 plants were divided into 2 groups of 4, 1 group was labeled hot and the other was labeled cold. 4 plants were watered with water that was 0 degrees celsius, and 4 plants were watered with water that was 40 degrees celsius. The plants were watered with 15ml of water. The water amount was measured each day to make sure the plants would have the same soil. Every day the plants were watered, the temperature was also measured each day to make sure the temperatures were the same each day. Notes were taken of changes of the soil and when the beans sprouted.

Observations:

On January, 19th bean seeds were planted in 2 inches of soil. The next 5 days there were no changes, on the 6th day a bean plant sprouted and it was labeled hot. It was very small at first at a height of about 1cm and a width at about 1.5cm, but within the next 4 days it was 15cm high with 2 leaves at 2.5cm each. 3 days later on the 9th day another plant sprouted, it was also a hot, still very small. This plant wasn't very healthy, growing slowly and dry. On the 17th day a cold plant sprouted, it took about 2 weeks to sprout, about 11 days longer than the 1st hot plant. This cold plant grew just as fast as the hot plant, it was about 15cm in 4 days. Both cold and hot plants seemed to gradually grow within the first 4-10 days, then they began to slow down and develop more leaves.(the plants continue to grow)

Interpretation/Conclusions/Applications:

In conclusion if you water a plant with hot water it grows faster than if you water a plant with cold water. My results seem to match the average timeline of the growth of a bean plant. If the plant is water under 15 degrees Celsius it takes 2 weeks or longer to sprout, if the plant is 23 degrees Celsius it will take 8-10 days to sprout. As a result of my experiment I have found out you could increase a growing season if your water is warm or hot.

"



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## Prefair Report

**2123**      **Camille Bouffard, Colesen Lebrun**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **La fosse de Marianne, sont les légendes vraies?**

**Summary:** "Notre foire scientifique porte sur un phénomène connu : la fosse de la Marianne. La fosse de la Marianne, soit la partie la plus profonde de nos océans, compte de nombreuses légendes. Celles-ci sont basées sur l'existence d'animaux marins éteints dont le mégalodon; le plus grand requin à avoir existé. Celui-ci ayant des dents de 20cm de long peut grandir jusqu'à 20m. Avec ceux-ci, il exécute une pression de mâchoire de 12 à 20 tonnes par pouce carré. Lui même, pèsait d'environ 100 tonnes. Les scientifiques disent de lui comme une espèce éteinte malgré qu'il y a des légendes disant de lui vivant. Il y a aussi l'existence du Kraken, une créature imaginaire. Cette géante pieuvre a été inspirée par le calmar géant ou le calmar colossal, qui peut atteindre quatorze mètres. Seul trois personnes auparavant ont visité cet endroit: Don Walsh, Jacques Picard et James Cameron. Nous en connaissons plus sur l'espace que sur le fond de nos océans. Nous trouvons que c'est important et intéressant d'en connaître davantage sur les fonds marins et ses mythes. Lors de cette recherche, nous tenterons de découvrir si ces animaux marins existent réellement dans la fosse. Est-il possible que le megalodon et le kraken puissent vivre dans ces profondeurs? Pour en savoir plus, nous vous invitons à consulter notre rapport scientifique.

"





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## Prefair Report

**2124**      **Felix Hand**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **How Do the Limitations of Air Affect the Biodegradation of Biomass**

**Summary:**    The purpose of this experiment is to see if and how the limitations of air affect the biodegradability of biomass. The hypothesis is that the absence of air will slow down the process of biodegradation. Biomass is being put into landfills and doesn't decompose as quickly, which takes up space over a long period of time.

I observed and recorded changes in colour, size, and different growths such as mould using photography and documentation daily for a period of 37 days.

In the experiment I added one fresh grape to four glass jars. Jar number 1 is a control jar I with one fresh grape only. Jar number 2 has 14.2g of plastic wrap and grape. Jar number 3 has 28.3g of plastic wrap and grape. Jar number 4 has 42.5g of plastic wrap and grape.

### Observations (colour)

Jar 1:

Day 4 it changed from red to dark red. Day 11 it changed from dark red to purple. Day 24 it appeared almost black. Day 35 it changed to black.

Jar 2:

Followed the same colour pattern as jar 1 except it remained dark purple.

Jar 3:

Followed the same colour timeline as jar 2.

Jar 4:

Followed the same colour timeline as jars 2 and 3 but was two days later.

### Observations (size)

On day 1 all grapes were 2cm diameter.

After one week jar 1 had shrunk by 3mm but none of the others had changed. After 2 weeks jar 1 had shrunk by 7mm, jar 2 had shrunk by 2mm, but jars 3 and 4 remained the same size. After 3 weeks jar 1 had shrunk by 9mm, jar 2 had shrunk by 5mm, jar 3 had shrunk by 4mm, and jar 4 had shrunk by 2mm.

After 4 weeks jar 1 had shrunk by 1cm, jar 2 had shrunk by 8mm, jar 3 had shrunk by 6mm, and jar 4 had shrunk by 3mm.

After 5 weeks jar 1 remained 1cm, jar 2 remained 8mm, jar 3 remained 6mm, and jar 4 had shrunk by 5mm.

### Observations (general)

Jar 1 wrinkled on day 4, started shrivelling on day 6, and completely lost its circular shape and was flat by day 27.

Jar 2 wrinkled on day 4, grew mould on day 8, and the mould disappeared on day 21.

Jar 3 wrinkled on day 5, grew mould on day 7, a hole filled with mould formed on day 16, and the mould changed between green, white, and orange.

Jar 4 wrinkled on day 7, a hole formed on one side of the grape on day 8, green mould filled the hole on day 13, and black mould grew on day 34.



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The more detailed analysis of these findings and their implications are still ongoing.



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## Prefair Report

**2125**      **Shalom Maniragaba, Aidan Laursen**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Fluides Coulants**

**Summary:**    "Fluides Coulants  
Comment pouvons-nous déterminer le débit d'un fluide?"

Cette expérience a été enrichie à l'aide de nos connaissances personnelles apprises en classe, en ajout d'une recherche à l'internet pour confirmer nos connaissances.

Hypothèse:

Pour cette expérience, nous avons utilisé une planche penchée à 45 degrés. Nous postulons que le taux d'écoulement du vinaigre sera le plus grand, suivi du jus de pomme, de l'eau, de l'huile de canola et que le taux d'écoulement du sirop d'érable sera le plus grand.

Matériel:

Gants  
Une planche en bois  
Papier d'aluminium  
150 ml d'eau  
150 ml d'huile de canola  
150 ml de sirop d'érable  
150 ml de jus de pomme  
150 ml de vinaigre blanc  
5 bocaux mason  
5 béchers de 50 ml  
Un chronomètre  
Une règle  
Du ruban adhésif coloré

Méthodologie:

Mettre chaque fluide dans des béchers différents, les remplissant jusqu'à la marque de 25 ml. Verser les fluides un par un dans leur colonne individuelle marquée sur le papier d'aluminium sur les planches.

À l'aide d'un chronomètre, calculer le temps que chaque fluide prend pour parcourir 23 centimètres.

Calculer le taux d'écoulement.

Noter et comparer les résultats.



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Résultats:

Résultats

Distance

(cm)

Temps

(s)

Taux d'écoulement

Eau

de Source

23

(9 Pouces)

0.36

63.8888889 cm/s

(63.888)

Huile de

Canola

23

(9 Pouces)

13.58

1.6936672 cm/s

(1.693)

Sirop

d'Érable

23

(9 Pouces)

13.55

1.697417 cm/s

(1.697)

Jus de

pomme

23

(9 Pouces)

0.70

32.8571429 cm/s

(32.857)

Vinaigre

Blanc

23

(9 Pouces)

0.31

74.1935484 cm/s

(74.193)

"



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## Prefair Report

**2126**      **Ryan Murphy**  
**Div/Cat**    **Life and Earth / Junior**  
**Title:**      **Clean Water - Filtration**

**Summary:** Clean water is essential for all life on Earth. As the planet's supply of fresh water continues to deplete, different filtration methods of cleaning water will become more and more necessary. In my project I will show samples of liquids that have been filtered using a simple filter column. I used a Clean Water Science filtration kit which included gravel, sand, active carbon, and filter paper to filter different liquids. In the column, liquids slowly move down through the gravel, the sand, the active carbon, and finally through the filter paper. I filtered a soil/oil/water mixture, a sport drink (red Gatorade), black tea, and soda (Coke), and examined the clarity of each liquid before and after filtration. The clarity, or the difference in clarity, after filtration was noted to determine the removal of possible contaminants. This experiment demonstrates how liquids can be effectively cleaned of some contaminants.

The research portion of this project will further examine the importance of clean water, communities without direct access to clean water (for example some of Canada's indigenous communities), different methods of cleaning water (different filtering systems, desalination. etc), and how climate change could be affecting our water supply.

Ensuring fresh water is available to the world's population is essential for the survival of humankind. Therefore, filtration is an important technology that we should continue to develop.



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## Prefair Report

**2127**      **Felix Melanson, Nicholas Lam**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Le battement cardiovasculaire des Daphnies**

**Summary:** "Les Daphnies magna sont des petit crustacés mesurant de 1,5 à 5 mm qui existent depuis l'ère précambrien (ère qui a duré plus que 4 billion d'années). Elles se trouvent en eau douce dans les lacs et les mares de l'hémisphère nord. L'organisme est protégé par une carapace translucide qui est faite de chitine, un polysaccharide dur et transparent. Cette espèce se nourrit en filtrant les particules suspendues dans l'eau. Les Daphnies magna (D. magna) sont des organismes fréquemment utilisés dans les études de bioanalyse pour évaluer l'impact que certaines substances peuvent avoir sur l'homme. Ces organismes sont utiles en raison de leur similitude aux mammifères; un exemple est leur tissu cardiaque myogénique. Les D. magna possèdent de nombreuses caractéristiques qui les rendent un bon spécimen de laboratoire. Premièrement, elles sont faciles à conserver en laboratoire. Deuxièmement, leur structure interne est facilement observable au microscope à cause de la transparence de la carapace. Finalement, quand les D. magna absorbent et consomment les divers composés des solutions dans lesquelles elles sont exposés. Pour ces raisons, et beaucoup d'autres, les D. magna ont été utilisées dans de nombreuses études qui font une comparaison de leur réaction physiologique avec celle des humains. Un autre avantage de D. magna est que les composés que nous allons leurs donner dans cette expérience ne se trouvent pas dans leur état naturel; ainsi, les D. magna n'ont pas pu développer une tolérance à ces produits et peuvent donc indiquer la véritable réponse à ces composés. Le but de cette étude est de déterminer les effets cardiovasculaires de diverses substances lorsque ingérées par les D. magna. Ces substances incluent l'épinéphrine, la labetalol et l'acétylcholine. Nous allons analyser l'effet des composés sur la fréquence cardiaque et les comparer.

L'épinéphrine est un neurotransmetteur et une hormone appartenant à la famille des catécholamines. L'épinéphrine est sécrétée en réponse à un état de stress ou en vue d'une activité physique, entraînant une accélération du rythme cardiaque, une augmentation de la vitesse des contractions du coeur, une hausse de la pression artérielle, une dilatation des bronches ainsi que des pupilles. En tant que médicament, elle est utilisée pour traiter un certain nombre de problèmes comme l'anaphylaxie, les crises cardiaques et les hémorragies cérébrales. Le labétalol est une molécule chimique avec les propriétés bêta bloquantes sur le système cardiovasculaire humain. Ce médicament est utilisé pour les patients avec une phase aiguë de la prééclampsie et comme médicament de première ligne pour les urgences hypertensives. L'acétylcholine, abrégée en ACh, est un neurotransmetteur qui joue un rôle important dans le système nerveux central. L'acétylcholine est un ester produit par l'enzyme choline acétyltransférase à partir de l'acétyl-CoA.

Après avoir conclu notre expérience nous avons découvert que l'épinéphrine pure augmente le rythme cardiovasculaire d'une Daphnie par 33.55 %, le labétalol pure diminue le rythme cardiovasculaire jusqu'à 63.52% et le l'acétylcholine peut la diminuer de 50.76 %

"



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## Prefair Report

**2128**      **Peyton Kehoe**  
**Div/Cat**    **Life and Earth / Junior**  
**Title:**      **Get Odour It**

**Summary:**    QUESTION / HYPOTHESIS:

This experiment was designed in an effort to determine which product out of Febreze, Rubbing Alcohol, Lysol and Captodor Odor spray works best at clearing bacteria on the surface inside of the hockey gloves of 11-year-old boys. It was hypothesized that the Lysol would work the best as on the bottle it stated that the Lysol product would kill 99.9% of bacteria and the other products weren't able to state that.

DESIGN / METHOD:

I was able to get my brother and his friends' hockey gloves to use. The first step of the experiment was to make the nutrient agar solution. I poured this mixture into Petri dishes and let it firm until I was able to move on to the next step. Once the nutrient agar was firm I swabbed all the gloves as a "before" test to how much bacteria started off in the gloves. Next, I sprayed each of the gloves with a different cleaning product and let them dry overnight. The next morning I swabbed the gloves again. After that, the gloves were used to play two more hockey games. Afterwards, the gloves were swabbed again to see which one held up the longest. All of the Petri dishes with the bacteria on them were placed inside of a scientific incubator and warmed at around 37° Celcius. Later, after 10 days of being in the incubator, I took the Petri dishes out and took pictures of them all.

OBSERVATIONS:

After the 10 day period, I was able to observe all the Petri dishes. I soon realized that my hypothesis was not correct and that the Febreze product had the least amount of bacteria. The bacteria on the Febreze glove before was very significant and after the testing, I was only able to find 3-4 colonies of bacteria growth on that petri dish. I was also able to observe the Captodor odour spray (which is meant for hockey gloves) was unable to get rid of the bacteria instead it grew more bacteria.

INTERPRETATIONS / CONCLUSIONS / APPLICATIONS:

I was able to take away from this project that the \$9.99 spent on the Captodor odour spray was not worth it as the product wasn't able to take away the bacteria and the gloves after using the spray didn't even smell good. I wonder why my hypothesis wasn't correct. I thought that the Lysol product smelled very good and I am disappointed that it wasn't able to work as well as Febreze. I have figured out that all of my data is qualitative and if I was able to do this experiment again I would try to find a way to have quantitative results to find out how much of the actual petri dish has bacteria growing on it. I found this experiment very helpful because I can use the results from this when cleaning my own hockey gloves.



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## Prefair Report

**2129**      **Anastasia Sulek-Popov**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Prévention de l'érosion**

**Summary:** "Le but de cette expérience est de découvrir si le mélange d'herbe couramment utilisée pour les pelouses des jardins au Canada est aussi efficace pour prévenir l'érosion que d'autres plantes utilisées par les fermiers pour protéger le sol. Les plantes utilisées sont la coronille bigarrée, le radis oléagineux, le sarrasin et le trèfle incarnat, ainsi qu'un mélange d'herbes qui contient le pâturin des prés, l'ivraie vivace, et la fétuque rouge traçante. Je postule que le mélange d'herbe sera la plus efficace car il est évident qu'elle fonctionne efficacement, d'après sa popularité. De plus, je crois que ses racines peuvent absorber un grand montant d'eau avant même qu'elle pénètre le sol, car elles forment une couche très dense avec beaucoup de volume à la surface du sol.

La procédure utilisée comporte deux pots à fleurs de chaque sorte de plante, en plus de deux pots sans cultures. Après 35 jours, nous pesons chaque pot et notons ce poids, avant d'arroser chaque pot sur un angle incliné avec une grande quantité d'eau. Ceci sert à imiter de la pluie sur une pente sujet à l'érosion. Les pots sont pesés 48h plus tard, après que le sol sèche, pour voir combien de sol s'est érodé. Les racines seront ensuite observées.

Au temps que ce rapport fut soumis, l'expérience pour déterminer quelle plante était la plus efficace pour prévenir l'érosion n'a pas été complétée puisque les plants ont besoin de plusieurs semaines pour pousser. Les résultats obtenus seront présentés lors de la foire.

"





# Frontenac, Lennox & Addington Science Fair

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## Prefair Report

**2131**            **Grace Fu**  
**Div/Cat**        **Life and Earth / Junior**  
**Title:**           **Edible Flavor Sachets**

**Summary:**    The purpose of my innovation was to create a biodegradable and edible material that could be used to store oil-based and dry ingredients. The production of this material and using it creatively could potentially reduce plastic pollution.

The ingredients used to make this film were 400ml of water, 30ml of potato starch, 10ml of soy lecithin, and 2ml of glycerine. These ingredients are biodegradable and edible (unless consumed in sufficient amounts, then they can be toxic). The ingredients are blended together by a hand blender and are cooked in a saucepan on medium heat. Once it boils, the heat is lowered and the mixture is let to be simmered for 2 minutes. The mixture is then poured into a non-stick pan to coat the base to the depth of 1 mm. It is let to be dried naturally on a level surface for 12-24 hours. When the edges start to lift, the film is peeled off and cut into rectangles. The rectangles are folded symmetrically and the edges are covered with parchment paper. A clothes iron is used to seal the edges but one is left open; this is where oil-based/dry ingredients are poured through. After that, the opening is sealed.

The film has a clear yellow colour, smooth plastic-like surface, and is flexible to some extent. It tastes slightly sweet but otherwise bland. It dissolves in water, so one should handle it with dry hands. It should be stored in a cool and dry place.

The usage of this material could potentially reduce plastic pollution. It could be used for storing the seasoning that comes with instant noodle packets. You don't have to open the seasoning sachet, just place it in the cooked noodles, mix it around, and the film will dissolve- leaving your noodles seasoned. If you happened to drop or lose the sachets outside, it won't harm the environment, since it is biodegradable and edible. Because it can't withstand water, the uses for the film is limited. However, the fact that it is heat-sealable and the human mind can think of creative ways to use it makes it a fairly versatile material.



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## Prefair Report

**2132**      **Yasmine Smaili**

**Div/Cat**    **Human Health / Junior**

**Title:**      **An essential oil a day keeps the bacteria away**

**Summary:**    Antibiotics are medications used to kill bacteria that have made significant contributions to present-day health. However, some bacteria have become resistant to commonly used antibiotics. They can survive and multiply in the presence of antibiotics and pass this trait on to new bacteria. Now, even the most potent antibiotics are unable to kill resistant bacteria. Bacteria grow stronger and more resistant every day. Studies have shown that some essential oils can be used as an antibacterial agent. Essential oils could be a natural alternative to antibiotics.

In my experimentation, I will test eucalyptus oil, black cumin oil, and tea tree oil against bacteria to determine their antibacterial capabilities. The objective of the experimental phase is to deduce what the most effective essential oil is against E.coli through the testing of them against each other. And after that, the most effective essential oil could be able to work as an effective antibiotic against E.coli.

I hypothesize that the black cumin oil will be the most effective at killing bacteria because studies have proven that it is an effective antibacterial agent.

To perform my procedure filtered disks dipped into each oil are placed on agar plates inoculated with Escherichia coli, Bacillus subtilis or Bacillus megaterium. The plates are then placed in an incubator for 24 hours. Then they are removed, and the zone of inhibition is measured in millimetres. This procedure is repeated for each species of bacteria. The independent variable is the kind of oil used. The dependent variable is the diameter of the zone of inhibition. The negative control is vegetable oil. The positive control is tetracycline

My experiments have not yet concluded. The results will be presented at FLASF.



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## Prefair Report

2133 Sydney Soederberg

Div/Cat Life and Earth / Junior

Title: Eye on the Matter: The relationship between eyes and vision among scavengers, predators and prey

Summary: "My project is about the differences that exist between the human (predator/scavenger) cat (predator) and horse (prey) eyes, and how their eyes have adapted to and influence these animals different lifestyles. When I first researched this topic, I was surprised at how different the eyes of animals that live in the same habitat are. I began to think, what if their eyes were adapted to their individual lifestyles? I worked off of that idea, but after a while of researching I began to realise this idea ran deeper than "prey animals have horizontal pupils and predators have vertical pupils." I started to realise that animal's lives are so intertwined with each other, that their eyes have adapted and developed for interactions between the species. Their eyes are have developed to complement their skills and help them not only to see, but to help defend or hunt other species. Animal's eyes are designed to not only help them survive, but thrive. I have been researching the eyes of the horse (prey), human (predator/scavenger) and cat (predator) and comparing their individual field of view, depth perception, vision acuity, detection of motion, perception of colour, night vision, pupil shape, and size and colour of each of their eyes to help me study their interaction with each other and their lifestyle. The definition "the eye is the window to your soul" is very accurate, but not in the way most people think it is."



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## Prefair Report

**2134**      **Timothy Vander Wilp**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Cozy Critters**

**Summary:** "I wanted to learn about the influence of anesthetic on the temperature drop of dogs and cats during surgery. I wanted to investigate how the temperature drop experience during the anesthetic affected the recovery time from the anesthetic after surgery.

My hypothesis was that a drop in temperature in dogs and cats during surgery will extend the recovery time. My research had indicated that temperature drop was commonly believed to affect the recovery time of patients - both human and animal. A drop in temperature can increase the occurrence of cardiac events, wound infection, and blood loss.

I went to two locations to do my research. My first location was White Dog, a Wobaseemoong independent nation near Kenora, Ontario. My second location was the Kingston Napanee Spay Neuter Clinic in Bath, Ontario.

In these locations I or a registered veterinary technician took the temperatures of dogs and cats before surgery, at the end of surgery, and at the time of recovery. For purposes of this project, recovery was when the patient was able to lift its own head. The recovery time was recorded as well as the weights of the patients.

What I discovered from my research was that the degree of temperature drop during surgery did not have any correlation with the recovery time of the patients after surgery.



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## Prefair Report

**2135**      **Roxanne Walsh, Claire Pullen**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Pourquoi les yeux des chats brillent ils la nuit]?**

**Summary:**    Foire Scientifique : Pourquoi les yeux des chats brillent ils la nuit&#8239;?

Roxanne Walsh et Claire Pullen, 7e, Marie-Rivier

Pourquoi les yeux des chats brillent ils dans la nuit? Il y a plusieurs croyances que leurs yeux absorbe le soleil pendant la journée et durant la nuit la rejette. Ce sujet nous semble très intéressant puisque les humains, nous n'avons pas les yeux qui brillent dans le noir.

Pour nos recherches nous avons divisé notre sujet en deux parties. La première partie est : Pourquoi les yeux des chats brillent-ils dans le noir, qu'est ce qui les rendent différents que les nôtres&#8239;? La deuxième partie est : Est ce que c'est une réflexion de lumière ou simplement une partie de leurs yeux qui est différent de les notres&#8239;?

### Question 1

Les chats peuvent voir puisque la lumière réfléchit des objets dans la cornée de leurs yeux. Après cela la lumière croise la pupille et l'iris. Par la suite la lumière continue sa course vers à travers le cristallin qui est responsable de la mise au point de l'image. Ce processus passe de la même manière chez l'homme que chez les chats. La principale différence est que les chats ont une structure supplémentaire qui se nomme le tapetum lucidum. Le tapetum lucidum réfléchit vers la rétine, lorsque ça se passe les yeux produisent un éclat ou une brillance.

### Question 2

Ce phénomène se produit envers plusieurs autres animaux comme les chiens, les chats, les cerfs, les chevaux et les furets. Cependant, les humains et les primates n'ont pas le tapetum lucidum qui est l'organisme qui permet les yeux de ces animaux de réfléchir la lumière dans le noir.

Dans notre hypothèse on croyait que la lumière a été réfléchi dans les yeux des chats. En réalité, il y a une partie dans les yeux des chats qui s'appelle le tapetum lucidum. Cette partie de leurs yeux est la partie qui fait en sorte qu'il y a une lumière qui est réfléchi. Ce qu'on peut conclure est que les animaux et les humains sont des êtres très variés. Ce que nous avons appris est que les chats et plusieurs autres animaux ont le tapetum lucidum dans leurs yeux, ce qui fait que leurs yeux brillent dans le noir.

En conclusion, ce projet a été très fascinant. Les chats sont des créatures remarquables et on adore explorer leurs caractéristiques. Leurs yeux sont très similaires à ceux d'autres animaux, comme les chiens, les cerfs, etc. On trouve que le tapetum lucidum est essentiel à leur survie. Si on compare la vie d'un écureuil et celle d'un chat, on peut voir que les écureuils se font tuer beaucoup



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plus souvent que les chats puisqu'à leurs yeux reflet la lumière et signale au chauffeur qu'il y a un chat sur la route. Nous sommes satisfait avec les résultat de nos recherches et du produit final.



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## Prefair Report

**2136**      **Mia Cantarutti**  
**Div/Cat**    **Life and Earth / Junior**  
**Title:**      **How To Prevent Soil Erosion**

**Summary:**    Project Title: How To Prevent Soil Erosion

**Problem/Best Alternative:**

The purpose of my innovation is to solve the problem of soil erosion, which is the loss of soil. Soil can be eroded by wind, water, tillage, etc. Soil is used in many ways and is a big resource in our world, so losing it is not efficient. So, that is why I am discovering awareness and ways to prevent soil erosion. The best alternative to preventing soil erosion by using vegetation. Vegetation includes plants and other natural resources. Vegetation holds the soil together by the roots and compacts it. For example, I'm showing how planting trees at the bottom of hills will reduce tillage erosion and also by building retaining walls on hills can help. Another example is planting trees and bushes around soiled places and reducing watering grass too much. When it comes to the soil on a beach, planting plants will help soil erosion from water tides coming in.

**Design/Method:**

To show the process of soil erosion I have taken three large plastic bottles and filled them with soil. One of them has grass growing in it, one with rocks in the soil, and one with just soil. When I pour a lot of water in the bottles, the erosion will show once the water comes out into a cup. You'll see that the one with grass causes the least amount of erosion.

**Observations:**

I've noticed that using vegetation holds the soil together by the roots, how it compacts it, and how the plants can absorb the water. I've also noticed that plants, trees and bushes can prevent rain from getting to the soil by the leaves. Another observation is that when you pour the water into the only soil bottle the water is yellow because of the eroded soil, but with the grass the water is clear because the grass prevents the loss of soil.

**Interpretations/Conclusions/Applications:**

I've noticed that the roots have acted as a filter to the soil so that it doesn't erode. Also, that the barriers/retaining walls act like a literal wall. When it comes to the bushes and trees around the soil, they act as a roof.



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## Prefair Report

**2137**      **Andrei Neder**  
**Div/Cat**    **Life and Earth / Junior**  
**Title:**      **Is Kingston getting warmer?**

**Summary:**    Is Kingston getting warmer?  
A study on the effects of global warming on our community  
By: Andrei Neder

### Introduction and Hypothesis

There are clear evidences that the weather has warmed on a global scale throughout the last century. Several prediction models indicate that areas situated at higher latitudes (i.e., closer to the Poles) are likely to suffer the most with increasing temperatures. Kingston's latitude (44° N) put our community exactly within this range. Higher temperatures also increase precipitation; interestingly, the water level of Lake Ontario has risen from 73.2 metres in 1910 to 74 metres in 2010 which is significant considering its large dimensions. Nevertheless, little is currently known on whether temperature has actually increased in Kingston in the past 100 years. This study aims to answer the following research question: is there any objective evidence that global warming has affected Kingston's weather? I hypothesized that the temperature in Kingston has indeed increased along the year from 1910 to 2010 leading to higher precipitations.

### Research Methods and Preliminary Findings

Daily temperature and precipitation measurements at Norman Rogers Airport, Queen`s University, and the Hydro plant near Napanee were recorded from the Government of Canada's Environmental and Natural Resources' database ([https://weather.gc.ca/city/pages/on-69\\_metric\\_e.html](https://weather.gc.ca/city/pages/on-69_metric_e.html)). Statistical analysis was performed using a statistical package (IBM SPSS(TM) software, version 22). Data were averaged by day and month in 3 different timepoints: 1910, 1960 and 2010. By plotting temperature and precipitation in each day of a given month, we also calculated the area over a reference value for both measurements. For example, an increase in the area above 0° C of mean temperature in the colder months and/or an increase in the area above 20° C in the warmer months from 1910 to 2010 would indicate a warming effect. We will also obtain the "heating-degree days": the number of degrees Celsius that the mean temperature is below 18 °C (a metric of heating requirements of buildings). We expect that the heating-days has diminished over time, indicating a warmer weather. Our initial findings indicate that in the summer months of 1910 and 1960 the average temperature was close to 20°C but it has increased markedly to 23-24° C in 2010. These findings were consistent with those found in every month of 2010. But the most interesting finding for the summer was the precipitation: as of June, 1910 there was 30 mm of precipitation, with a little bit more in June, 1960 (40 mm). But in June, 2010 there was 150 mm of precipitation, a 500% increase compared with 100 years before.

### Conclusions

Our preliminary findings are strongly supportive of our hypothesis that the global warming did impact negatively on Kingston weather leading to consistently higher temperatures and precipitation rates across the year.  
(study not done)





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## Prefair Report

**2138**      **Eileen Hickey**  
**Div/Cat**    **Life and Earth / Junior**  
**Title:**      **Kingston Cat Count & Study**

**Summary:** I am a cat lover. I frequently observe cats in my neighbourhood and in natural areas close to where I live. I admire cats as hunters but wonder about their predation on birds. Across the world, there is a big debate about whether cats should be allowed to roam outside of their human homes. Some ecologists even advocate for stray and feral cats to be euthanized. The arguments for or against these policies are usually based on mathematical models. Very few field studies have quantified the impact of cats on specific environments. The DC Cat Count is the only large field study of cat populations that I could find. Despite this lack of data, some cities are making policies to exterminate feral cats, to spay/neuter more cats, or to ban pet cats roaming from their home. Without sound data, we cannot assess these programs. We also cannot currently predict which specific cats are the greatest risk for predation on local birds.

A field study of cats is necessary so that we can develop and evaluate policies to protect vulnerable birds while showing compassion to cats. This field study will help us evaluate programs such as Kingston's trap/neuter/vaccinate/return program for feral cats, and the need for a low-cost/high-volume cat spay/neuter clinic.

My project will begin this field study of Kingston's cats. My aims are to:

- 1) Begin to estimate how many cats roam the city of Kingston and how far they roam.
- 2) Identify whether these unsupervised cats are feral, strays or pets.
- 3) Determine whether cats are active in potentially vulnerable ecosystems.

I will meet these aims by conducting a Cat Count in the neighbourhood of Grenville park of Kingston. I chose this location because it is adjacent to the Little Cataraqui Creek Marshland, a potentially vulnerable ecosystem.

My project will include:

A door-to-door survey of the households of Grenville Park to collect data on the total number of pet cats. I will collect data on how the cats were acquired, whether they have been spayed/neutered/vaccinated, and whether the cats are allowed outside.

If the cats are allowed outside, I will request permission to attach a GPS tracker to the cat in order to measure how far it wanders and whether it enters the Little Cataraqui Creek Marshland.

Use of 'camera traps' on human and wildlife trails in the Little Cataraqui Creek Marshland, to measure cat activity and identify specific cats who enter this natural space.

My final results will be presented at the fair. I will replicate the broad procedure of the DC Cat Count. My data collected in Kingston will contribute to more understanding about the effect of cats on the natural world. In conclusion, I hope that this project will help us develop policies (like trap/neuter/vaccinate/release of feral cats, or affordable access to cat neuter/spay) that best help protect vulnerable species from cat predation.



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## Prefair Report

2139 Rayyan Mounib

Div/Cat Life and Earth / Junior

Title: PARTNERS IN CRIME: BLOOD EDITION

**Summary:** INTRODUCTION:  
My science fair project is comparing the ability of hydrogen peroxide and a phenolphthalein solution to detect blood. How it works is simple; a phenolphthalein solution is applied to an area where there might be blood using a cotton swab. If the swab becomes a bright pink almost immediately, then it's blood. Hydrogen peroxide can also be used to detect the presence of blood. However, phenolphthalein and hydrogen peroxide both have limitations. I will be investigating those limitations.

The chemical equation for the Kastle Meyer Test using phenolphthalein is,  
 $\text{heme iron Fe}^{4+} + \text{phenolphthalein (colorless)} + \text{H}_2\text{O}_2 \rightarrow \text{phenolphthalein (pink)} + \text{H}_2\text{O} + \text{heme iron Fe}^{3+}$ . The Kastle Meyer Test detects the presence of hemoglobin, which is the iron containing portion of a red blood cell.

On the other hand, the hydrogen peroxide reacts with the catalase present in blood.

QUESTION: Which solution is better to use when detecting the presence of blood, hydrogen peroxide, or phenolphthalein solution?

HYPOTHESIS:

Although I haven't performed the actual experiment yet due to some difficulties obtaining the materials such as the animal blood and the phenolphthalein solution, according to science and my extended research, it is very likely the hydrogen peroxide will give more false positives as it can react with substances other than blood, while the phenolphthalein solution is more reliable if not infallible.

### MATERIALS

-Q-Tips or Cotton swabs	-Yeast(bacteria)	-Fresh chicken	-Knife
-Fresh Potato	Fresh beef	-Cutting Board	-Cow blood
-Fresh onion	-Paper plates	-Liquid Measuring cup	
-Red food coloring	-Disposable gloves	-Eye dropper	

### PROCEDURE (SIMPLE)

Put on gloves.

Place different substances on paper plates.

Test them with hydrogen peroxide.

Write down all observations.

Repeat the procedure, but this time using phenolphthalein solution.

Write down all observations.

Fill in table.\*

Compare results

(TABLE DOES NOT SHOW UP)

EXPERIMENT IN PROGRESS



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## Prefair Report

**2140**      **Jessica Lui, Lydia Thorley**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Really Green or Just Mean**

**Summary:**    Question/Hypothesis:  
The point of this experiment is to determine if eco-friendly cleaning products are actually better for the environment than regular cleaning products. When forming a hypothesis, we ran into a bit of trouble. There is almost no research done on green cleaning products. So we turned to comparing the ingredients lists, and it was rather surprising. The only difference in the dish soap was that the green one contained dyes and the regular one did not. Both still had a chemical called methylisothiazolinone, or MIT, which is cytotoxic, meaning toxic to cells. It is unknown how much of the human population is sensitized (allergic) to MIT. If it can do that much to humans, it will definitely do at least as much to plants and animals. In the laundry soaps, there were only 2 ingredients that were in both: water and fragrance. In the toilet cleaners, there were many ingredients that had dye in it, whereas there was none in the green toilet cleaners. In the regular toilet cleaner, there is a chemical called butylphenyl methylpropional which can contribute to allergies. This chemical acts like a fragrance and is a possible human immune system toxin. This chemical is in many different cleaning products including laundry soap. The all purpose cleaners were very different, having only a few matching ingredients, all of which being non-toxic or natural. Based on the amount of similar, toxic ingredients in all of these products, we hypothesize that the majority of our cleaning products will harm the plants equally, with something being the least and something else being the most.

Design/Method:  
First, 20 Marigold seeds are planted, and are watered as the soil became dry with just enough water to make the soil moist (2-3 tbs). Then, after waiting a week after the first plant sprouted before measuring the height, (this is because plants tend to grow very sporadically during the first few days). After a week, the plants are measured daily and are watered with a 25 percent pollutant, 75 percent water solution. There are four different household cleaning products that were used, each with a regular and eco friendly option. The goal of this experiment was to see if all of the eco friendly cleaning products really are any better for the environment. The results are to be recorded and graphed at the end of the experiment.

Observations:  
N/A  
Interpretations/Conclusions/Application:  
N/A



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## Prefair Report

**2141**      **Camryn Boyd**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Straight From The Horse's Mouth**

**Summary:**    How do different environments and diets impact equine dental health?  
It is hypothesized that domestic horses whose diet consists of softer grain meals and hay will have more dental issues than feral horses, because when the teeth aren't worn down enough by tougher foods, they can develop sharp enamel points.  
So far, I have learned about what the equine dental structure looks like, with no abnormalities, and also seen pictures of both domestic and feral horses teeth. From these pictures I found that feral horse teeth wear faster than domestic horse teeth. From the websites I visited, I also learned that stables horses who eat from hay nets placed well above ground level, therefore having to eat with their heads stretched up; compared to feral horses who graze with their head down, may end up with their jaws aligned differently, which will put the teeth in an unnatural position, leading to uneven wear on the teeth. I already knew that domestic horses may have sharp enamel points because of their softer meals, but I never knew how food could wear down teeth, considering how hard teeth are. After learning about equine dental structure, and how the horse's mouth works, I now know that softer meals require less time and effort to consume, and need less side-to-side movements.



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## Prefair Report

**2142**      **Noah Chin**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **The effects of liquids on plants**

**Summary:**    This project looks at the effects of different liquids and different volumes of liquids on plant growth.

Purpose/Question

How does changing the liquid a plant gets affect the growth of the plant?

Hypothesis

I think changing the liquid a plant gets will affect it in different ways, I think the plants that get liquids with the most acidity will grow the least, and die the fastest. But the plants that get sugary liquids, will grow faster and taller.

Design/Method

I have germinated the seeds (mung beans) in the same environment with the same amount of water, some grew more than others. So, I transferred the plants into pots with potting soil, and I put a taller plant with a shorter plant. I took 6 liquids, water, orange gatorade, vitamin water, apple juice, coca cola, and vinegar and had 2 pots with 2 plants for each liquid, one pot will be getting 5mL of the liquid, and one will be getting 10mL of the liquid. I will water the plants every day, and measure the results every 2 days.

Observations

So far the plants getting the most acidic liquid aren't doing well, they are getting skinnier, getting weaker, and falling to the soil. But there is one that stands out, the plants getting coca cola are getting a lot taller, stronger, and they are doing better than any other plant. I think this is because it is a sugary liquid.



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## Prefair Report

**2143 Mallock Boisvert**

**Div/Cat Life and Earth / Junior**

**Title: The Science of Casein Plastic**

**Summary:** My Experiment questions:  
If you mix milk and vinegar it will create casein plastic through a chemical reaction of warm milk and vinegar. What will be the impact if you change the amount of vinegar or type of milk (skim vs homo)? Will it affect the plastics finished product and how?

My Hypothesis:  
When I add more vinegar the mass of casein plastic will increase due to the extra vinegar reacting with the same amount of milk. I do not anticipate a significant amount of difference in final casein plastic available when comparing skim milk with homogenized milk.

My Method:  
The procedure is simple, first you warm milk to 49 degrees Celsius and add the vinegar. Then you filter the curds created out and dry them. Finally what's left will harden and form the casein plastic.

My Observations:  
Mixing 20 ml of vinegar into 250 ml of milk both homo and skim milk created casein plastic. Using less vinegar did not work at all meaning the plastic did not form a solid mass. Using higher amounts of vinegar did not increase the mass of plastic. Using 20, 30, 40 and 50 ml of vinegar resulted in similar final amount of casein plastic (each was different by a few grams). The milk used makes a huge difference surprisingly in a lot of different ways. The reaction with Homo milk generated 60% more plastic compared to skim milk (34.5 grams vs 21.5 grams). The texture of the casein plastic was also different between the 2 types of milk.. Homo milk transformed into wet dough and did not want to stick together, it stuck to everything else. While skim milk formed one large piece of dough that was very hard to separate and difficult to mold after squeezing out moisture.

My Conclusions:  
In conclusion my hypothesis was wrong in both ways and I figured out why. The combination of heat and vinegar (acetic acid) precipitated out the protein casein from the milk. Adding more vinegar once the solid was formed did not make a difference because there was too much vinegar so not all of it reacted with the milk. To change the mass of plastic at the end I would also have to add more milk.

To help explain the difference in the amount of plastic formed using different types of milk I looked at fat content on the label. Fat is one of the three ingredients in the formed plastic, minerals and the protein casein are the others. The 0% skim milk has no fat and it resulted in less plastic formed and its characteristics are different.

I did some research and learned that casein plastic is still used in many things today including fountain pens. It is a good alternative to plastics made from petroleum because this plastic is environmentally friendly and it will eventually decompose, unlike plastics made from petroleum products.



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## Prefair Report

**2144**      **Meghan Smith**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **UNDER PRESSURE TO GROW**

**Summary:**    Can plants grow in outer space? NO! Plants need soil, water, and air to grow. By putting these elements in a closed container along with seeds growth can occur. So would increasing the air pressure in the closed container effect the growth of plants?

This experiment looked to determine the effect of air pressure on the growth of bean seeds/plants in a closed container. The hypothesis was that plant growth would be affected by the greater air pressure.

Three "terrariums" were set up containing twenty-nine bean seeds each which were embedded in soil. These seeds were watered only once. One terrarium was left open to allow air to freely exchange. One terrarium was sealed to prevent air from free exchange. One terrarium was sealed and pressurized to twice the normal atmospheric pressure.

Observations were made weekly to determine the number of seeds that grew into plants and survived. Qualitative assessment of growth changes for the plants in each terrarium were recorded to include plant height, leaf formation, plant/leaf colouration, and stem thickness. After four weeks of growth the plants were removed to qualitatively assess how the roots grew. The plants from each environment were measured to determine their average length and weight for quantitative assessment.

The complete results will be presented at science fair.



# Frontenac, Lennox & Addington Science Fair

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## Prefair Report

**2145**            **Kian Hashtrudi**  
**Div/Cat**        **Life and Earth / Junior**  
**Title:**            **Virophages: Fighting Fire With Fire**

**Summary:**    QUESTION/HYPOTHESIS:

The literature-based study that I am doing for Science Fair is on virophages. The purpose of this study is to better understand a fairly new sub-category of virus which is the virophage. The study was also to see whether or not virophages pose a threat to humanity or a human individual. My original hypothesis based on the current knowledge I had on the virophage before I started my research was that it was neutral to humans although my findings were quite different and they shocked me.

RESEARCH FINDINGS:

During my research on these specific virii, I found three major findings. My first major discovery was that virophages only infect giant virii such as the Mimivirus, hence their name. The virophage cannot reproduce because they lack the enzymes that regular virii have in their viral envelope. As a result of this deficiency, virophages need to infect giant virii so the virophage can hijack the reproductive enzymes of the giant virii and use it. They also either sterilize the giant virus they have hijacked during this process or harm them in a way that they can only reproduce deformed versions of giant virii which essentially sterilizes the offsprings of the giant virii. Since this action is classified under parasitism, a group of virologists use this as evidence to push a movement that claims virii are alive just like cells. They claim if they can attack and infect each other, it is a sign of life. If they succeed, this could prove cell theory wrong which is widely believed to be true. My second major finding was that virologists have been trying to find a way to genetically modifying virophages. By modifying it, they intend to utilize its parasitic effect on a virus to combat intense viruses such as HIV, HPV, or Ebola. My last finding in this research was that the virophage's origins come from about the same time period as when the first giant virii were introduced to the planet. This shows that maybe there was an intention of having prey and predator activity with virophages and giant virii. The group of virologists who claim virii are alive use this evidence as claims that if they are evolutionary created to have a prey and predator relationship, a virus is just like regular living beings and should be a classified micro-organism.

INTERPRETATION/CONCLUSION/APPLICATIONS:

From my research on virophages, I have determined that the virophage is first of all a very new subject in the scientific community and that is the primary reason why it is less known. Although the potential for it to serve a good purpose for humanity as well as what new information about ancient virii that we may understand from them, are beyond what any of us imagined. Significantly, they can be genetically modified to help humans combat some of the deadliest virii they have encountered (HIV, Ebola).





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## Prefair Report

**2146 Sarah Essaddam**

**Div/Cat Life and Earth / Junior**

**Title: "Fingering" Fingerprints and Toe Prints**

**Summary:**

Question/Hypothesis

The main idea of my study is to examine fingerprint patterns of siblings pairs, and unrelated individuals in order to compare them. I will also verify if toe prints patterns follow the same rule. I think that the sibling pairs will have the same fingerprint pattern and that the individual pairs will mostly likely not have the same fingerprint pattern.

Design/Method

Using a red ink pad, participants will print their fingerprints. Some will print their toe prints. I will observe and see if siblings will have the same fingerprint and compare it with the unrelated pairs of individuals.

Observations

After examining all fingerprints, I noticed all four pairs of unrelated individuals have different fingerprint patterns and the two pairs of siblings, have the same fingerprint pattern. Both pairs of siblings have the pattern of a whorl.

Interpretation/Conclusion/Application

I think this happened because DNA that an individual inherits from their parents determine whether right-handed or left-handed, the colour of their eyes, they're hair colour etc. All biological siblings are a mixture of their parents DNA. Therefore, if DNA determines fingerprint patterns, then siblings are more likely to share the same fingerprint category than two unrelated individuals are.

I will continue gathering fingerprint patterns of siblings and unrelated individuals, And I will start gathering toe prints.

Work in Progress



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## Prefair Report

**2147**      **Alanna Craigie**

**Div/Cat**    **Life and Earth / Junior**

**Title:**      **Creating a cheap and efficient water filter**

**Summary:** My project was originally a passion project for school. It was creating a cheap and efficient water filter. I chose to do this project because I realize how important clean drinking water is for you and because it's creating something and also solving a problem. While making my project I had a hypothetical situation where the water pipes were frozen so you needed to melt snow for drinking water. Fresh snow is fine without any purification or filtration, but I could see dirt in it so my goal was to filter it out and that the water would become drinking water. I made three different filters. Each filter had activated charcoal, sand, coffee filters, cotton balls and 2 had gravel. In the first one the water got filtered very quickly so I knew there was something wrong, also the water came out cloudier than when it went in. I figured out the gravel was dusty and it was dirtying the water. I tried again but with rinsed gravel and the water was still cloudy, I also put folded cheesecloth at the bottom of my filter. In my final filter I used 2 coffee filters instead of 1, absolutely no gravel and a cheese cloth stretched over the top of the filter. The most important thing I learned was the skill to find fault in my work and figure out how to solve the faults.