

JSHS

JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM

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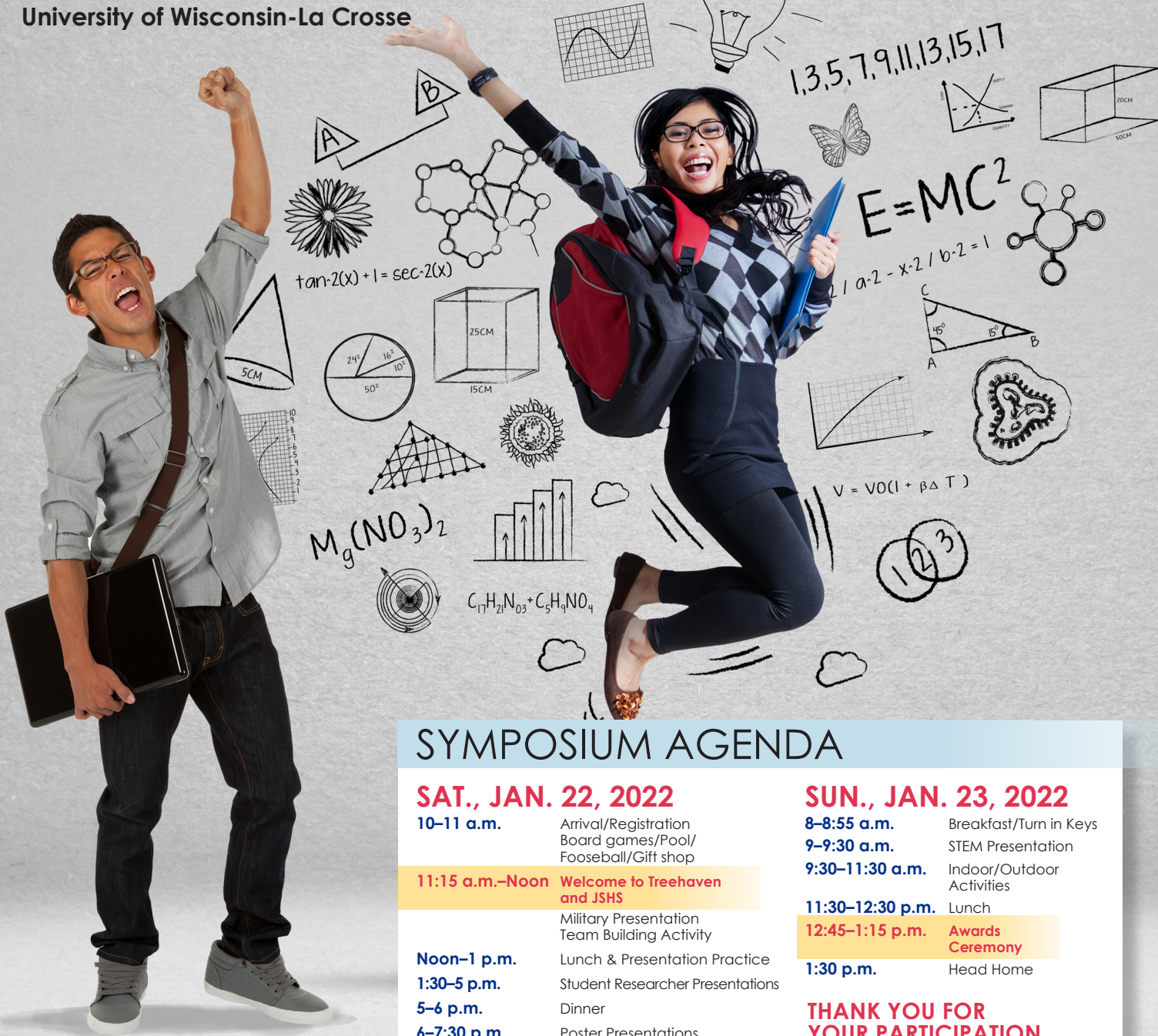
Co-sponsored by

University of Wisconsin-La Crosse

Wisconsin-Upper Peninsula of Michigan JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM

January 22–23, 2022 | Tomahawk, WI

UWLAX.EDU/EX/JSHS



SYMPOSIUM AGENDA

SAT., JAN. 22, 2022

10–11 a.m.

Arrival/Registration
Board games/Pool/
Foosball/Gift shop

11:15 a.m.–Noon **Welcome to Treehaven and JSHS**

Military Presentation
Team Building Activity

Noon–1 p.m.

Lunch & Presentation Practice

1:30–5 p.m.

Student Researcher Presentations

5–6 p.m.

Dinner

6–7:30 p.m.

Poster Presentations

7:30–9:30 p.m.

Night Hike/Snacks/Movie/Games

10 p.m.

Quiet Time

SUN., JAN. 23, 2022

8–8:55 a.m.

Breakfast/Turn in Keys

9–9:30 a.m.

STEM Presentation

9:30–11:30 a.m.

Indoor/Outdoor
Activities

11:30–12:30 p.m.

Lunch

12:45–1:15 p.m.

**Awards
Ceremony**

1:30 p.m.

Head Home

**THANK YOU FOR
YOUR PARTICIPATION**



$$\Phi = \vec{E} \cdot \vec{S}$$

$$\vec{E} = \sum \vec{E}_i$$

ORAL PRESENTATIONS

LAUREL ADAMS

Cashton High School

Survey of Mississippi River Unionids for Viruses Associated with a Mortality Event in the Clinch River

Many mussel populations in North America and other parts of the world have seen catastrophic declines and mass mortality events, raising concerns about what this trend may mean for aquatic environments. Mussels provide invaluable services to the ecosystem, from water filtration to water quality indication to food web enhancement. Their shells provide habitats and nesting sites for small fish and insects. In the past, unionid population declines have been attributed to pollution, habitat degradation and the introduction of exotic species with little consideration given to the role of disease until recently. The cause of these declines remains enigmatic, however a link was discovered between cases of mortality and a novel densovirus (hereafter referred to as Clinch densovirus 1). The purpose of this study was to determine the prevalence of this densovirus and several other viruses (Clinch CRESS virus 1, Clinch picorna-like virus 1) among mussels in the Mississippi river. Samples from 59 mussels of various species and location were collected and hemolymph samples were taken from their anterior adductor muscles. A subset of 30 samples was chosen for analysis. Samples were analyzed via recently developed qPCR assays and results indicated that two Pocketbooks (*Lampsilis cardium*) tested positive for Clinch picorna-like virus 1. One Wabash pigtoe (*Fusconaia flava*) was positive for both Clinch picorna-like virus 1 and Clinch densovirus 1. Further study is necessary to confirm they are indeed the same viruses, but results may indicate a range and host expansion for the viruses, which could have implications for mussel populations in the Mississippi river. The assays evaluated in this study could be used to survey different geographic regions, to evaluate mortality events, and to study how much the virus replicates in experimental studies.



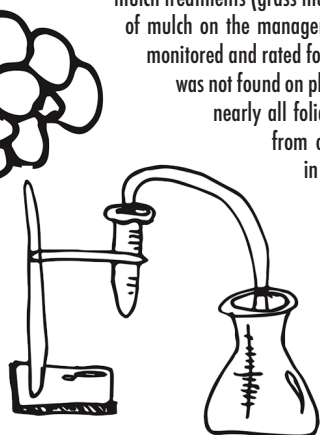
KATIE ALDERSON

Cashton High School

Evaluating Types of Mulch for Foliar Disease Prevention on Tomatoes

Pizza, spaghetti, soup, ketchup, BLTs - all foods Americans love. But what do they have in common? Tomatoes. One of the most common produce items used in restaurants and selling up to 340 billion pounds in 2014, tomatoes are certainly an influential crop. But one plant disease, in particular, has been tormenting tomato farmers and home gardeners alike for years: early blight. Early blight is a disease of tomato plants caused by a fungal pathogen, *Alternaria solani*. The disease causes plant damage starting on old foliage and eventually spreading upward on the plant to the stem and fruit of tomato, potato, eggplant, and other nightshade or solanaceous plants. The common disease can significantly decrease fruit yield and quality, hurting the world of tomato farming. Mulch is commonly used in gardens to prevent weed growth, improve soil moisture, and sometimes prevent the spreading of plant diseases from plant residue sources. The effectiveness of plastic mulch, grass clippings, and no mulch cover is not well documented for home garden settings.

In his study, we investigate the effects of 'Brandywine' tomatoes grown on 3 different ground mulch treatments (grass mulch, plastic ground cover, and no mulch) to determine the impact of mulch on the management of early blight and other foliar diseases. The plants were monitored and rated for disease percentage throughout the growing season. Early blight was not found on plants, however, Septoria leaf spot became highly prevalent, killing nearly all foliage on the plants. The mulch did not prevent Septoria leaf spot from overtaking the plants. Overall, mulch treatments did not result in significant differences in foliar disease or marketable yield or quality. Weather conditions during 2021 were highly unusual with high heat and bouts of intense rainfall. While our results were not clearly conclusive, we did learn that early blight isn't highly prevalent in this research location and further investigation is warranted to best determine the impact of mulch on foliar disease and yield/quality of tomato.



LIAM GILFILLAN

Ripon High School

Water Assessment Of Silver Creek Including Effects of Road Salt Use On Chloride Levels

Bodies of water, and the organisms within them, are often negatively affected due to pollutants that come along with urbanization and industrialization. This has significant economic implications in the great state of Wisconsin which derives a considerable portion of its income from water-based tourist and fishing activities. In the present study, a water and microorganism assessment of Silver Creek in Ripon, Wisconsin was conducted at two urban locations from April 2014 to October 2021. Additionally, further samples from three urban and three rural sites were collected and analyzed for chloride concentration using the Mohr Method. Currently no chloride data for this body of water exists, so we are trying to establish if there are any negative impacts from our current road salting practices. We are seeing some indicators suggesting high chloride concentrations in the spring months and the degradation of Silver Creek's overall health. Future research should be conducted to determine which mitigation measures are effective at improving our local stream and lake health.

SILAS EBELING

Wisconsin Lutheran High School

Virus Deactivation by Ozone

The purpose of the experiments presented in this paper was to find a way to effectively deactivate viruses. Variables of humidity, time, and ozone concentration were changed to find the most effective way of deactivating viruses. The virus TLS was put on to different materials and placed into an ozone chamber for a set period of time; the virus was then mixed with an *E. coli* culture and plated, and the amount of virus that killed *E. coli* was measured. At 1 hour in the ozone chamber and 200 ozone ppm was extremely efficient at deactivating the virus (99.9%) with high humidity. With ozone, high humidity was about 1000 times more effective at deactivating viruses than ambient humidity. Ozone chambers with 200 ozone ppm, 1 hour deactivation periods, and high humidity can be used to deactivate viruses on masks and many other commonly-used objects.

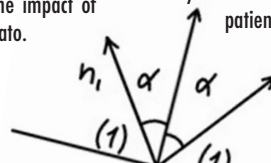
ERIN HU

Brookfield Central High School

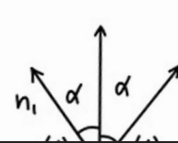
Impact of Dietary Consumer Behavior on Non-alcoholic Fatty Liver Disease Vary by Socioeconomic Status

Non-alcoholic fatty liver disease (NAFLD) affects 25% of adults, becoming the most prevalent cause of liver disease in the world. Although socioeconomic factors are known to have an effect on NAFLD, the effects of food spending and dietary consumer behavior on NAFLD is unclear. This study aims to evaluate the impact of food spending and dietary consumer behavior on NAFLD. The study used data from the National Health and Nutrition Examination Survey (NHANES) 2017 to 2018, including FibroScan, diet, and consumer behavior data. Participants (n=3486) were categorized into no NAFLD, NAFLD without advanced fibrosis, and NAFLD with advanced fibrosis based on Fibroscan. High- and low-income groups were distinguished using self-reported family monthly income and poverty index. A multivariable ordered regression model was conducted. The results showed that frequent fast food consumption was associated with more severe NAFLD in high-income (HI) groups, while more frequent home preparation of meals and greater proportion of money spent on groceries protected against NAFLD in HI groups. These findings were not found in low income (LI) groups. HI groups have better diet quality, particularly in those who prepare meals at home more frequently. These findings indicate that dietary consumer behaviors—such as fast food consumption and home preparation of meals—are independently associated with NAFLD, but this may be affected by economic status. Thus, lifestyle interventions for NAFLD should consider patients' dietary behavior, such as fast food consumption and home preparation of meals, but should consider diet quality which is likely affected by the individual's socioeconomic status.

$$T = 2\pi\sqrt{\frac{l}{g}}$$



$$\Phi = \vec{E} \cdot \vec{S}$$



$$T = 2\pi\sqrt{\frac{l}{g}}$$

$$M = \frac{dl}{dt}$$

$$\frac{M}{N_A}$$



ORAL PRESENTATIONS

ARYAN KALLUVILA

Hartford Union High School

An Accurate Super-Resolution Approach for Low-Field MRI Imaging via U-Net Convolutional Neural Networks

The medical field is becoming increasingly reliant on medical imaging for diagnostic procedures. Although traditional high-field MRI scanners produce high-quality images, they are inefficient for emergency neuroimaging tasks and quick analysis of the patients' conditions. However, low field MRI scanners are portable, cost-effective, and safer tools for non-invasive diagnostic imaging. Such scanners can be wheeled to the patient's bedside due to the low strength of the scanners [1][2] (64 mT-brought down to 1/1000 of the magnetic field strength of traditional scanners). I was able to generate high-resolution images from representative low SNR down-sampled scans via a machine learning approach. Traditional machine learning super-resolution (SR) reconstruction methods for medical imaging that utilize general architectures like static convolutional neural networks (SCNNs) or recurrent neural networks (ReCNNs) are unable to reconstruct precise anatomical figures [7][8]. Hence, I proposed a U-Net to produce high-resolution images more accurately and efficiently. Unlike SCNNs and ReCNNs, U-Nets concave layers of the same shape to preserve feature upscaling which produces more anatomically correct results. My aim in this study was to accurately down sample high resolution MRI scans to reflect image quality attainable at low field and utilize a machine learning reconstruction approach to increase their resolution. Here, I evaluated this novel approach on T1-weighted downsampled scans to demonstrate the efficiency of my network. Additionally, I employed three different loss functions to determine which would optimize the U-Net on the highest resolution: mean-squared error (MSE), structural similarity index (SSIM), and visual geometry group loss (VGG).

RIDHI MOHAN

Brookfield East High School

Developing an Associative Network Model Method to Elicit Tip-of-the-Tongue Syndrome for Clinical Use in Memory Disorders

Tip-of-the-Tongue (ToT) syndrome has been studied in metacognitive and clinical research for the purpose of understanding its implications on conditions such as Parkinson's disease, aphasia, and multiple sclerosis. ToT occurs when one cannot remember a certain word but can recall words of similar form or can recall the first few letters of the word. This study aims to not only develop a new, efficient method using an associative network model that can be used in clinics and laboratories to elicit ToT in subjects but additionally discover if ToT is mostly characterized by partial or abstract-form recall, both different types of recall one can experience with ToT. All participants had no known memory conditions. In this study, participants had an audio recording of a short list of words and their definitions played to them. The participants' main job was to remember the words to the best of their ability. Once this was over, they were asked a series of questions that would then determine whether they experienced ToT and which type of recall. Overall, not only was the method more efficient than methods used in past ToT research, but the results revealed that ToT was mainly characterized by partial recall.

ADITYA PILLAI

University School of Milwaukee

Innovative Augmented Reality Based Rehabilitative Tool for Arm-Related Injuries Utilizing HoloLens

Arm injuries are a common issue among all age groups. However, there are not many accessible ways for a patient to perform their rehabilitation while in a home-based environment with observation and performance-based guidance from a medical professional. The proposed solution aims to solve this issue using the Microsoft HoloLens Augmented Reality headset and Kinect v2 motion sensor. For this project, a Unity-based rehabilitation video game for the HoloLens, which imitates certain exercises that aid in the rehabilitation of the arm joints, was developed. Additionally, a MATLAB program was used that utilizes the Kinect v2 motion sensor in order to measure the different arm joint's range of motion (ROM) and their respective degrees of freedom. To test the validity of the game, a control group test with ten healthy adult subjects was conducted. From observing that collected data would repeat on separate runs of the game when the subject was told to complete the model level—a target shooting level—in the same order for each time they played it, it can be concluded that the Kinect can actually test a subject's arm joint's ROM for doctors to observe in order to further aid in the patients' rehabilitation process.

ETHAN WANG

Homestead High School

Efficient Cauchy Distribution Based Quantum State Preparation by Using the Comparison Algorithm

The quantum Monte Carlo algorithm can provide significant speedup as compared to its classical counterpart. So far, most reported works utilize Grover's state preparation algorithm. However, this algorithm relies on costly controlled Y rotations to apply the correct amplitudes onto the superposition states. Recently, a comparison-based state preparation method was proposed to reduce computational complexity by avoiding rotation operations. One critical aspect of this method is the generation of the comparison threshold associated with the amplitude of the quantum superposition states. The direct computation of the comparison threshold is often very costly. An alternative is to estimate the threshold with a Taylor approximation. However, Taylor approximations do not work well with heavy-tailed distribution functions like the Cauchy distribution which is widely used in applications such as financial modeling. Therefore, a new state preparation method needs to be developed. In this study, an efficient comparison-based state preparation method is proposed for the heavy-tailed Cauchy distribution. Instead of a single Taylor approximation for the entire function domain, this study uses quantum piecewise arithmetic to increase accuracy and reduce computational cost. The proposed piecewise function is in the simplest form to estimate the comparison threshold associated with the amplitudes. Numerical analysis shows that the number of required subdomains increases linearly as the maximum tolerated approximation error decreases exponentially. 197 subdomains are required to keep the error below 1/8192 of the maximum amplitude. Quantum parallelism ensures that the computational complexity of estimating the amplitudes is independent from the number of subdomains.

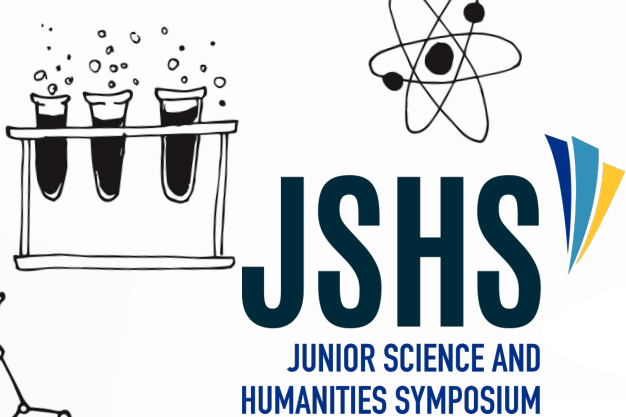
COVID PROTOCOLS

Masks must be worn except when eating, bathing, or sleeping.
 There should only be a maximum of two people per lodging room at any time, with the exception of family members/related people.
 Several rooms will be available for eating to social distance.
 Please maintain a 6-foot distance between you and others.

*"Every great thing starts first with an idea,
 followed by a doubt and finally a resolve to abandon or pursue.
 Victory is a treacherous journey!"*

Dane Cook





$$\Phi = \vec{E} \cdot \vec{S}$$

$$\vec{E} = \sum \vec{E}_i$$

POSTER PRESENTATIONS

Wisconsin-Upper Peninsula of Michigan Junior Science and Humanities Symposium

ALEXANDRA CANO

Big Foot High School

The Effectiveness of Lemon Juice as an Antimicrobial Agent in Plant Tissue Cultures

Most people do not have the materials in order to grow explants in tissue culture without contamination. Those that do not have ethanol, bleach solutions, or even a pressure cooker in order to sterilize their work areas are more likely to have such contamination. We wanted a solution for this contamination; we hypothesized, if diluted lemon juice is placed into agar then, when exposed to bacteria from air, the agar with lemon in it will have a less amount of bacterial growth than an agar without diluted lemon juice because the acidity of the lemon will prevent any contamination that grows within the agar. With our added lemon juice, the likelihood of contamination is decreased. As part of a lab procedure, we replicated someone with access to such things like a pressure cooker, ethanol, bleach and sterile water. We also simulated a person who may not have access to such equipment. To do so, we conducted three trials with different sealing points of each culture. They are as follows: the first trial sealed right away, a second trial sealed after being exposed to open air for 30 seconds, and a third trial sealed after being exposed to open air for 60 seconds.

AMANDA BENDER

Big Foot High School

The Effect of Nutrient Breakdown on Extruded Feed Compared to Non-extruded Feed

Extruded feed or pellet feed has become more used in the swine industry than non-extruded or made by mixing feed. If by proving that both the non-extruded and extruded feed have the same nutrients, then it can be proven that the extruded feed is more cost effective and easier to feed on a small and large scale. This could then lead using this process in allowing the farmers to be cost efficient in not only the purchasing of feed but also the aspect of where they spend their time to feed the swine. Non-extruded feed, could then also help hobby farmers and large-scale farmers, by allowing them have extra time to focus on the nutrients that the hog needs and not focus on making sure they don't go over budget. If the extruding of swine feed reacts by breaking down sugar and starch similar to the way non-extruded feed does then it is shown that extruded feed is cost effective and would have the similar effect on swine's digestive system. Using the results of the research, it can be concluded that the extruded feed, if tested in the correct order, would in fact have almost the same exact nutrient breakdown as the non extruded. This then proves that the extruded and non-extruded are similar in nutrients and that the extruded feed can be cost effective and easier to make and purchase compared to the non-extruded feed.

JOSHUA BENDLE

Big Foot High School

How Does pH Affect the Growth of Chive Plants?

The reason I did this experiment was to see the effect of pH on plants. I was looking to see if the plants would survive or die on low, ideal, and high pH level solutions. I gave 3 chive plants water, a vinegar solution, and a baking soda solution. I expected the vinegar to kill the plants the fastest, as it was the most acidic and the baking soda wasn't very alkaline. However, once I finished with my data, it seemed that the baking soda killed the plants the fastest. The Distilled water kept the plant growing pretty rapidly. Vinegar also kept the plant growing for a day, but at a slower rate. But, the baking soda solution was keeping the plant the same height, maybe even slowly killing it. I think the reason it was stunting the plant's growth is because the baking soda didn't dissolve properly and was in the soil. This was a problem because the nutrients in the soil now had baking soda in it, so the plant was absorbing baking soda more rapidly than the dissolved vinegar. The plant with the baking soda was stunted because the roots were absorbing baking soda, which was drying out the plant.

NATALIE DILLER

Verona Area High School

An Experiment in Using Lemongrass as a Natural Deterrent to Leafcutter Ants in Costa Rica

Leafcutter ants (*Atta Cephalotes*) are foragers. They mainly live in tropical rainforests and are native to Costa Rica. They particularly love to forage cacao (*Theobroma cacao*) but avoid harvesting lemongrass (*Cymbopogon*). This experiment was designed around using lemongrass as a deterrent to leafcutter ants on cacao plantations. Both a field and lab experiment were conducted, testing a lemongrass pulp mixture as well as lemongrass extract. Lab experiment results had many errors, making data unreliable. Field experiment results were viable. Data from the field was statistically significant, proving the lemongrass pulp mixture to be effective as a natural deterrent.

NORTHINA GOEDEKKE

Big Foot High School

How do Different Exercises Affect How Much Carbon Dioxide Your Body Produces?

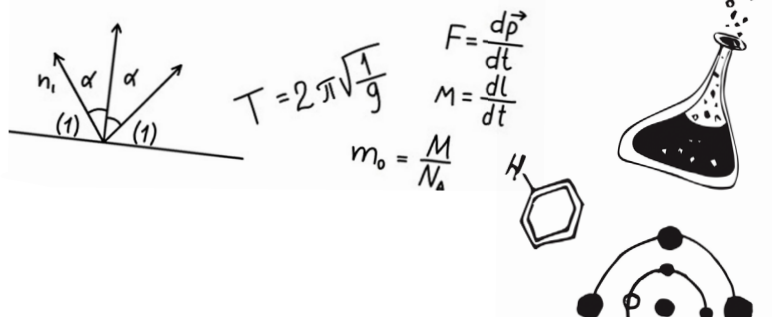
In this experiment we were trying to find out which exercise causes your body to make the most amount of carbon dioxide. We did this by having three different people do four different exercises for 1 1/2 minutes. After they did the exercise we had them breath into the BTB solution until it turns into a greener color than the solution originally was and time the amount of time it takes and how much breaths is taken before it turns green. We do this three times in order to get a more exact answer. In the end running caused your body to make the most amount of carbon dioxide, while jumping jacks caused your body to cause the least amount of carbon dioxide.

EVAN HENNINGFELD

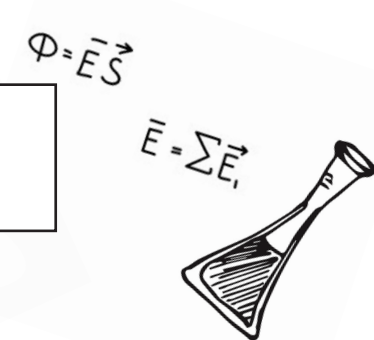
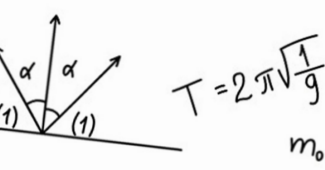
Big Foot High School

The Effects of Three Honey Sources on *E. coli* Bacteria

Honey is known to naturally have antimicrobial properties. This project is focused on identifying if honey will kill *E. coli* bacteria. This project is looking to create a new market for the honey, in addition to being consumed as food. Long term, I am interested in creating another use for honey as a healing solution that kills bacteria infused into bandages. This would give beekeepers the options of selling their honey for both food and medical use. This could make the demand for honey production higher, which would mean more people would start beekeeping, or beekeepers would add more hives. Overall, this would add to the pollinator population, which is great because many agricultural products need pollinators to be produced. In the test, I measured the zone of inhibition on bacterial agar plates, the average distance was 3.16mm and ranged from 2.57 to 3.66mm. The control had no inhibition zone, the Brazilian honey zone was 2.57mm, and the Walmart brand honey had 3.25mm. The Henningfeld Honey had the biggest average distance of 3.66mm from the edge of the disk to the bacteria. Although, a difference was found in each type of honey, I do not think it is enough to conclude that a certain type of honey would kill more bacteria, but it was effective as an antimicrobial.



POSTER PRESENTATIONS



ETHAN JACKOWSKI

Big Foot High School

PCR Replication of the PV92 Gene on Chromosome 16

PCR, Polymerase Chain Reaction, is a method scientists can use to replicate and study a segment of DNA. This has vast applications that we use often. PCR can be used during crime scene analysis and handling of DNA evidence. It can also be used to screen for viral disease. A common application we see today during the COVID-19 Pandemic. In this procedure, a test subject who has recessive traits from both parents was screened for their PV92 Genotype. Using PCR the PV92 gene on Chromosome 16 was replicated to be studied. This was done by extracting DNA from cheek cells and adding a master mix that contains nucleic acids, magnesium, taq-polymerase, and PV92 primer, and running it through a thermocycler. The thermocycler runs through three heat phases which denatures, anneals, and extends the DNA segment. The isolated segment is then separated into bands using Gel electrophoresis. The distance these bands traveled were compared to a heterozygous standard and a recessive control to determine the genotype on the test subject. The findings of this experiment were in line with the thesis that was determined at the beginning of the experiment.

HENRY KOERNER

Big Foot High School

Comparing Agriculturally Related Events to Agricultural Literacy Levels of High Schoolers in Grades 9-12

Agriculture touches the lives of individuals every day, and some do not even realize it. As a means to educate society, agricultural education initiatives and studies have been put into place all over the world, such as the Judd-Murray Agricultural Literacy Instruments. These instruments allow agricultural literacy levels of many people to be studied and represented. This study examined and compared the impact of the number of agriculturally related events experienced to a person's agricultural literacy score based on the JMALI. The comparison was made by administering the agricultural literacy instrument to students in grades 9-12 and high school staff who then completed the assessment. The questions covered basic agricultural material that the test subjects would be exposed to in everyday life. Questions in the assessment also regarded demographics of the test subject and the number of agriculturally related events they experienced. Based on findings, it was concluded that a lower number of agriculturally related events produced a higher level of agricultural literacy. It was also concluded that the test subjects gained an understanding of what agriculture encompasses and that almost all subjects were impacted, in a positive manner, in regard to their perceptions of agriculture. Findings revealed that the need continues for agricultural programs and education to inform all about the importance of the broad field of knowledge regarding agriculture.

KARLIE KROENING

Big Foot High School

Do Different Color Plants have the Same Color Pigments Present in Similar Amounts?

The purpose of this lab was to find out what leaves have what kind of pigments and if a leaf is one color, would it have different color pigments. What I thought would happen is that if a leaf is one color it would have green pigment that comes out. For example, spinach which is a green leaf should consist mostly of green pigments. To test my hypothesis, I got different leaves which were spinach, romaine, and then three different color leaves that would come off the tree which were an orange leaf, a dark brown leaf, and a yellow leaf. Then I put the leaf on the chromatography paper and rolled the edge of a coin over it so that the pigment would go on the paper. Then I put the paper into a container that has the chromatography solvent and waited until the solvent was done traveling up the paper. Finally, where the pigment lines were on the paper is measured and got the Rf value and here are my results. The leaves that showed dark green pigment were the spinach leaf which had an average of 0.37 for the Rf value and the romaine leaf (average Rf value of 0.35). The leaves that showed a light green pigment were the spinach leaf (0.33 average Rf value) and the romaine leaf (average Rf value of 0.34). There was only one leaf that showed yellow pigment which was the yellow leaf and the Rf value was at 0.17. The last pigment that was shown in the leaves was orange. This was found in the brown leaf at an Rf average of 0.39, the yellow leaf (Rf average of 0.41), and the orange leaf which had an Rf value average of 0.46.

EMMA NISUIS & ABIGAIL PHILLIPS

Big Foot High School

What Material Blocks the Wi-Fi Signal at Big Foot High School the Most?

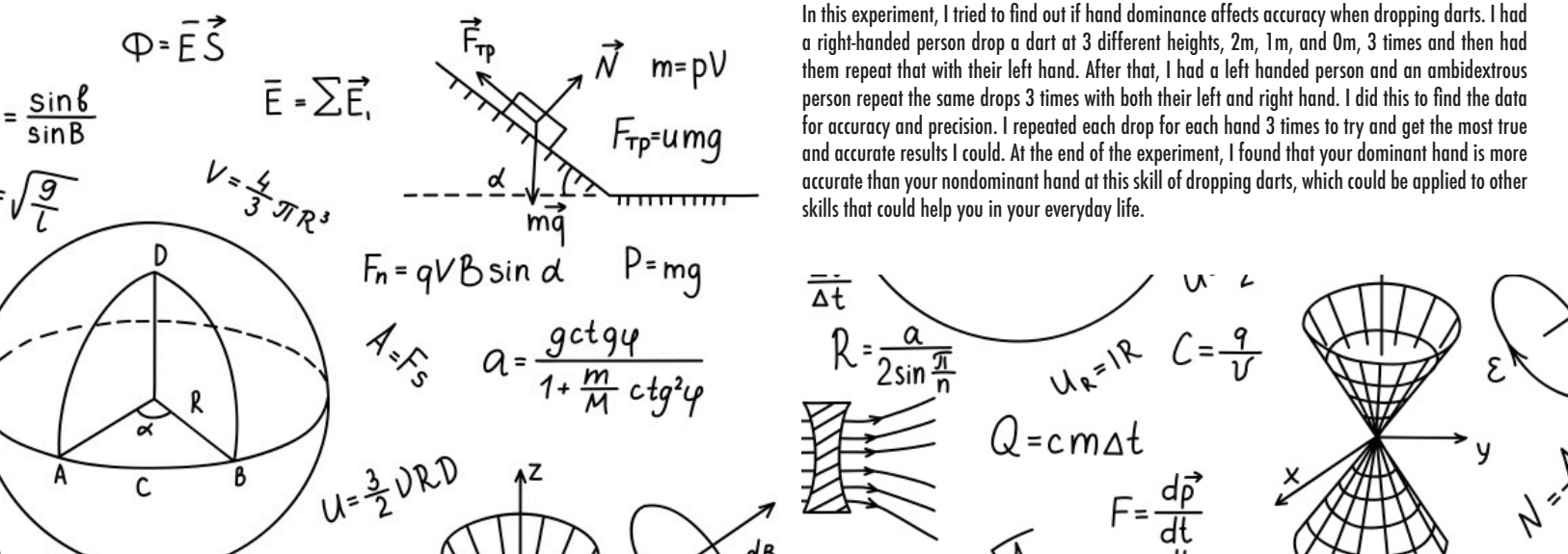
Have you ever wondered why your Wi-Fi is good in one room and bad in another? We did too. At Bigfoot High School our Wi-Fi can be very on and off. Wood, metal, and cinder block, the three top materials that block signals. For the most part the whole makeup of our school. For high school students Wi-Fi signals can be a big deal. So we decided we wanted to know which material would block the signal the most. After going in and out of different pockets of our school we concluded that the cinder block gave us the worst Wi-Fi signal. After we conducted this experiment, we realized that the signal strength wasn't the lowest but the overall was the worst blockage.

EMMA ZIMMERMAN

Big Foot High School

How Does Hand Dominance Affect Accuracy and Precision?

In this experiment, I tried to find out if hand dominance affects accuracy when dropping darts. I had a right-handed person drop a dart at 3 different heights, 2m, 1m, and 0m, 3 times and then had them repeat that with their left hand. After that, I had a left handed person and an ambidextrous person repeat the same drops 3 times with both their left and right hand. I did this to find the data for accuracy and precision. I repeated each drop for each hand 3 times to try and get the most true and accurate results I could. At the end of the experiment, I found that your dominant hand is more accurate than your nondominant hand at this skill of dropping darts, which could be applied to other skills that could help you in your everyday life.



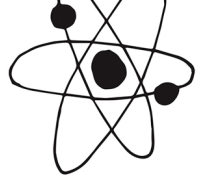
$$\Phi = ES$$

$$\vec{E} = \sum \vec{E}_i$$



JSHS

JUNIOR SCIENCE AND HUMANITIES SYMPOSIUM



Wisconsin-Upper Peninsula of Michigan Junior Science and Humanities Symposium

2022 JSHS Participant List

Big Foot High School Walworth, WI

- Chloe Amann
- Kasey Andrews
- Alexx Beetstra
- Amanda Bender*
- Joshua Bendle*
- Breanna Browning
- Alexandra Cano*
- Ivon Castaneda
- Miya Duesterbeck
- Northina Goeddeke*

Angela Gulotta-Teacher

- Evan Henningfeld*
- Brooklyn Hill
- Peyton Hill
- Ethan Jackowski*
- Henry Koerner*

Lisa Konkel-Teacher

- Karlie Kroening*
- Emma Nisius*
- Abigail Phillips*
- Ocampo Ricardo
- Emily Zimmerman*

Brookfield Central High School Brookfield, WI

- Erin Hu**
- Ling Mei

* Poster Presenter
** Oral Presenter

Brookfield East High School Brookfield, WI

- Mohana Ashanivas
- Ridhi Mohan**

Cashton High School Cashton, WI

- Laurel Adams**
- Katherine Alderson**
- Julia Boisen
- Connor Butzler
- Logan Christianson
- Quinn Cook
- Lana Gretebeck
- Dylan Kaduc

Julie Lundeen-Teacher
Nick Wall-Teacher

Hartford Union High School Hartford, WI

- Aryan Kalluvila**
- Rachana Kalluvila

Homestead High School Mequon, WI

- Jenna Lee
- Ethan Wang**
- Weizhong Wang

Onalaska High School Onalaska, WI

- Benjamin Hsieh
- Chien-Hung Hsieh
- Ching-Yin Hsu

Ripon High School Ripon, WI

- Adam Banerjee
- Liam Gilfillan**

Brad Roost-Teacher

- Nicole Roost

University School of Milwaukee Milwaukee, WI

- Aditya Pillai**
- Krishna Pillai

Verona Area High School Verona, WI

- Julie Berndt
- Natalie Diller*

Hope Mikkelson-Teacher

Wisconsin Lutheran High School Milwaukee, WI

- Daniel Ebeling-Teacher
- Silas Ebeling**

University of Wisconsin-La Crosse

- Jennifer Docktor, Ph.D.,
Physics Educator
- Teresa Mika, Ph.D.,
Biology Educator
- Lisa Pitot, Ph.D.,
Science Educator

JSHS Support Staff

- Heidi Masters, Ph.D.,
Regional Director
- Adam Masters,
Regional Assistant
- Spencer Hulsey,
Outreach Program Specialist

Join us again next year for the Wisconsin-Upper Peninsula of Michigan JSHS January 21-22, 2023

UNIVERSITY OF WISCONSIN LA CROSSE UWE

OBJECTIVES

To Promote

Research and experimentation in the sciences, humanities, mathematics, and engineering at the high school level.

To Recognize

The significance of research in human affairs, and the importance of humane and ethical principles in the application of research results.

To Search Out

Talented youth and their teachers, recognize their accomplishments at symposia, and encourage their continued interest and participation in the sciences, humanities, mathematics, and engineering.

To Expand

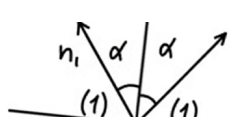
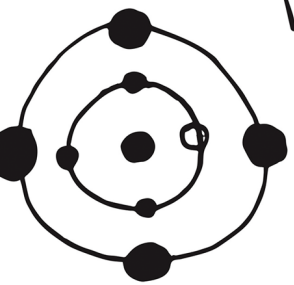
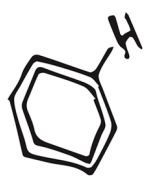
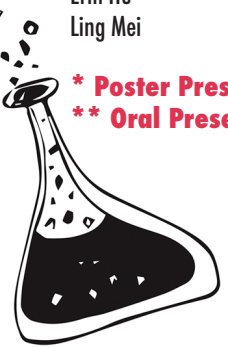
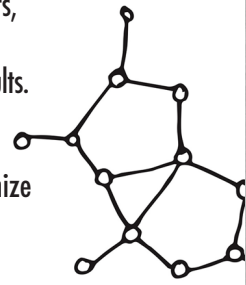
The horizons of research-oriented students by exposing them to opportunities in the academic, industrial, and governmental communities.

To Increase

The number of future adults capable of conducting research and development.

The Wisconsin-Upper Michigan Junior Science and Humanities Symposium is presented annually by the University of Wisconsin-La Crosse School of Education and Department of Military Science in cooperation with the National Science Teachers Association and the United States Army Research Office, Office of Naval Research and Air Office of Scientific Research.

The Symposium is one of 48 similar regional programs conducted by the National Science Teachers Association. Outstanding students from regional symposia will be chosen to participate in the 60th National Symposium to be held in Albuquerque, NM, April 20-23, 2022.



$$T = 2\pi\sqrt{\frac{l}{g}}$$

$$F = \frac{dp}{dt}$$
$$M = \frac{dl}{dt}$$

