Presenters_Abstracts

F

PROJ# F 1

NAME: Matthew Campbell **GRADE:** 9

GENDER: Male

SCHOOL: West Lafayette Jr/Sr High School

PROJECT TITLE: The Difference in CO2 Production Between Switchgrass and Corn Stover as a Byproduct of Ethanol Production

ABSTRACT:

The purpose of this research was to determine the effectiveness of the production of sugar by pretreated corn stover or pretreated switchgrass. CO2 as a byproduct of ethanol production was measured. Corn stover and switchgrass were pretreated in 1 molar H2SO4. The pH was then brought back to 4.8 by NaOH so that cellulase could be added. The solution was mixed with yeast (Saccharomyces cerevisiae). CO2 production from the reaction was measured by a CO2 probe. The CO2 produced by the switchgrass demonstrated an average change of 1,905.63 ppm, as compared to the average change of 966.30 ppm of the corn stover tested. Further, the control samples for switchgrass and corn stover demonstrated an average change of 1,557.62 ppm and 600.11 ppm respectively. However, the study was inconclusive as to whether switchgrass (Panicum virgatum L.) produced more CO2 as a result of the breakdown of the lingo-cellulosic structure as compared to the corn stover (Zea mays L.)

PROJ# F 2

NAME: Shannon Sacksteder **GRADE:** 11

GENDER: Female

SCHOOL: Eastern High School

PROJECT TITLE: Determining the Antiproliferative Effect in Human Lung Cancer Cells by Quercetin

ABSTRACT:

Current cancer research is studying plant flavanoids in hopes of finding new cures. Being able to test and stunt cancerous cell growth could be of great use for the future. The purpose of this project was to determine the optimal serial dilution of quercetin to inhibit lung cancer cell growth. If lung cancer cells were exposed to quercetin, the flavonoid would have antiproliferative effects on lung cancer cells. Cells from the human lung cancer cell line H1793 were placed into cell culture flasks containing 5mL of tissue culture medium. The culture was checked daily, and the medium was replaced every 48 hours due to accumulated cell waste. When the cells multiplied and reached a confluency of 80%, they were trypsinized, collected, and counted using a hemocytometer. Cells were seeded in 96 well plates at 5000 cells/well in growth culture medium. After 24 hours, the medium was replaced with another medium containing charcoal stripped fetal calf serum which lacked hormones to reduce the contribution of added hormones to the growing cells. After another 24 hours, the cells were treated with optimal concentrations of quercetin, which were determined using serial dilutions. The concentrations of quercetin used in this experiment included 25, 50, 75 and 100 nM and mM. Two controls were also applied: the untreated cells and a DMSO treatment. Cell proliferation was determined by applying proliferation assays on days 2 and 4, and absorbance readings at a 490 nM wavelength were performed using a microplate reader. Each treatment was applied to the growing cells four times. Using the proliferation data collected, the LD50 for quercetin was determined. The results showed that the concentration it took for the cells to reach an LD50 (50 percent cell apoptosis) was 67.9 uM. The proliferation rate of the cells on day 2 significantly differed from the cell proliferation rates on day 4 when the cells were treated with uM quercetin concentrations. However, due to possible pipetting errors, the SEM (Standard Error of the Means) of the DMSO controls and 50 nM concentrations were unexpectedly high; thus concluding that this data, according to statistical analysis, may not be accurate. The LD50 was determined and, therefore, the hypothesis was supported.

PROJ# F 3

NAME: Zachary Schmidt **GRADE:** 12

GENDER: Male

SCHOOL: Northwestern Sr High School

PROJECT TITLE: Effects of Stimulants on Muscle Tissue Augmented with Bodybuilding Supplements

ABSTRACT:

The purpose was to determine whether commonly used stimulants (caffeine, epinephrine, and a saline control) will enhance the performance of muscle tissue augmented with commonly used bodybuilding supplements (creatine, whey protein, and ginseng root.) If the augmented muscle tissue was injected with stimulants, then an increase of performance will occur. Common bait leeches (muscle tissue) were fed the bodybuilding supplements prior to being subjected to strength tests after a stimulant injection. The leeches were suspended on a scale apparatus (a hanging hook with a centimeter scale backdrop) and stimulated with electric current (12V, 200mA, 1 Hz, sinusoidal wave) while masses (2g – 25g) were added after each stimulated contraction. Comparisons of the average length of contractions (ALC) and average percent of contractions (APC) to the saline injected control fed leeches were taken. Preliminary ginseng exposure caused 100% death in specimens. Preliminary caffeine injections caused a significant ($F(2,12) = 3.89$, $p > .05$) 61.1% decrease of 0.6 cm ($F=5.28$) in ALC and 21.4% increase of 12.8% ($F=4.66$) in APC in the creatine fed specimens. Preliminary epinephrine injections caused a significant ($F(2,12) = 3.89$, $p > .05$) 82.9% increase of 49.6% ($F=4.66$) in APC in the creatine fed specimens. All other data were insignificant according to the F-distribution and the null hypothesis was accepted for the effects of stimulants on the control and whey protein groups along with the effects of the creatine and whey protein on the saline, caffeine, and epinephrine groups.

PROJ# F 4

NAME: Emily Schubert **GRADE:** 12

GENDER: Female

SCHOOL: Northwestern Sr High School

PROJECT TITLE: Probiotic Bacteria: Medical Applications of Lactobacillus acidophilus

ABSTRACT:

The purpose of this project was to determine the success of Lactobacillus acidophilus in inhibiting the growth of harmful bacteria that have historically developed antibiotic-resistant strains. If the invasive organisms Bacillus cereus, Serratia marcescens, and E. coli were introduced to the probiotic microflora in equal quantities, then L. acidophilus would restrict 80-90% microbial growth. Populations were checked at 24 and 48 hours by spreading 0.1mL of the inoculated broth over agar and allowing at least 24 hours to incubate. Since L. acidophilus does not grow on solid media, this test determined the % inhibition by the probiotic compared to the control. All tests were significant compared to control. The pH of the broths was used to indicate the production of lactic acid by L. acidophilus in hostility. B. cereus decreased by 1.16 pH when combined with L. acidophilus ($t=4.56>t0.05=2.306$), S. marcescens decreased by 1.8 pH($t=18>t0.05=2.306$), and E. coli decreased by 2.26 pH($t=6.86>t0.05=2.306$). The spread plates of mixed cultures after 24 hours of incubation showed significant inhibition on infectious bacteria by L. acidophilus. B. cereus lost 54% growth($t=4.10.7>t0.05=2.306$), S. marcescens lost 77%($t=12.2>t0.05=2.306$), and E. coli lost 61%($t=4.39>t0.05=2.306$). Spread plates after 5 days of interaction showed similar rates: E. coli lost 67%, S. marcescens lost 71%, and B. cereus lost 72%, however, on average, inhibition rates were higher and more consistently around 70%. The hypothesis was partially supported. Results indicate an antibiotic response of at least 50% degradation. Current tests show the effects of hydrochloric acid on mixed cultures broths.

PROJ# F 5

NAME: Sarah Warren **GRADE:** 9

GENDER: Female

SCHOOL: West Lafayette Jr/Sr High School

PROJECT TITLE: Leaching and Nitrification of Ammonia (NH3) Through Soil, Sand and Clay

ABSTRACT:

The ability of plants to absorb nutrients from the soil will depend on the texture and pH level of the soil. Water moves many nutrients through the soil. This process is called leaching. Fertilizer can move through some soil types. If clay holds more water molecules because of lack of draining and leeching, then clay will hold the most ammonium compare to the sand and soil. Three vertical plastic tubes were set up each containing either soil, sand and or clay. A solution of ammonia and diH2O was run through and the leached solution was tested using nitrogen testing strips. The nitrification of the ammonia to NO2- and NO3- was inconclusive, but the ammonia levels in the diH2O that moved through were considerably less in the clay than the soil and sand. If clay retains more nutrients then it could be the better choice of soil for a garden.

PROJ# F 6

NAME: Marisha Wickeremsinhe **GRADE:** 10

GENDER: female

SCHOOL: Brebeuf Jesuit Prep School

PROJECT TITLE: The Dissolution of Various OTC Medicines under Different Physiological pH Conditions

ABSTRACT:

This experiment was designed to understand the dissolution of over-the-counter (OTC) medicines under physiological pH conditions. The success of this experiment was based on the fact that it was possible to prepare physiological pH solutions using household items (vinegar and baking soda). The pH conditions tested in this experiment covered the physiological pH range of the human stomach and intestine (pH 2, 4, 6 and 8).

The results showed a wide range of variability in the dissolution time of the different OTC medicines tested. Six of the eighteen medications tested did not dissolve in any of the pH solutions (all six were common vitamin tablets). This was an unexpected observation because it may indicate that these vitamins are poorly absorbed, taken as directed. Nine of the tested medications showed similar dissolution times in all four pH solutions. Actifed showed a 3-fold difference in dissolution times between pH 2 and pH 6. Vitamin E softgels and potassium capsules dissolved at pH 2 within 25 minutes but did not dissolve at any other pH, indicating that pH is a key factor in the dissolution of some medications.

The effect of pH on the dissolution of coated tablets/capsules (film-coated, sugar-coated and uncoated) of the same drug was also tested. Excedrin and Tylenol tablets and caplets dissolved within 5 minutes across all four pH conditions. However, generic ibuprofen and acetaminophen tablets and caplets required between 5 and 25 minutes. This could be important when seeking immediate relief from pain or fever.

The validity of this experiment was tested against a sample of authentic simulated gastric and intestinal fluid and the results showed that the dissolution rates were comparable with the results from this experiment.

Additionally, antacid tablets at the prescribed dose were tested to see the impact on a solution of pH 2. The results showed that the antacid was able to increase the solution from pH 2 to pH 4 within five minutes.

In conclusion, this study shows that not every medication sold OTC undergoes dissolution at physiological pH levels and that the dissolution of certain medications is dependent on the stomach and intestinal pH. This data also showed that some medications may not undergo complete dissolution.

PROJ# F 7

NAME: Kevin Winklepleck **GRADE:** 12

GENDER: M

SCHOOL: Lighthouse Christian Academy

PROJECT TITLE: Enhancing Flame Resistance of Fabric

ABSTRACT:

My project for this year was to improve the safety of the public by developing a clothing detergent that would, during the process of washing one's clothes, increase the flame resistance of the fabric. For this experiment, I took four of the most commonly used fabrics in clothing today (denim, wool, fleece, and cotton) and tested each independently without treating them with my detergent. Afther this, I tested the same type of materials in a similar fashion, only prior to the testing I washed each fabric using my detergent solution. I did this with two different detergent mixtures, the first having twice as much detergent in relation to the fire-proofing solution, and the second having an equal amount of both detergent and fire proofing solution. After testing the fabrics, I recorded and sorted the information, and compared the data gathered from the treated fabrics to those of the untreated fabrics. After doing this, I found that the treated fabrics had an increase in flame resistance by about fifty percent. This testing proved that a detergent which can improve the flame resistance of clothes can be manufactured and, with enough testing, be perfected to the point of reaching the market.

PROJ# F 8

NAME: Jessica Wright **GRADE:** 10

GENDER: Female

SCHOOL: Terre Haute South Vigo High School

PROJECT TITLE: Detection of Panton-Valentine leukocidin (PVL) gene among Methicillin-Resistant Staphylococcus aureus

ABSTRACT:

Objective: The purpose of this project is to test for the distribution of the cytotoxin PVL gene amongst various methicillin-resistant Staphylococcus aureus(MRSA).

Introduction: MRSA has become a growing crisis in the medical field because of its resistance to numerous antibiotics. The two most common forms of MRSA are HA-MRSA (hospital-acquired methicillin-resistant Staphylococcus aureus) and CA-MRSA (community–associated methicillin-resistant Staphylococcus aureus). HA-MRSA and CA-MRSA both have the gene called mecA, which determines the methicillin resistance in MRSA. Even though HA-MRSA and CA-MRSA are both variants of MRSA, CA-MRSA is more virulent than HA-MRSA. The toxin Panton – Valentine leucidin (PVL) is commonly associated with CA-MRSA. PVL attacks our body's white blood cells, or leukocytes, which dramatically weakens the body's immune system. My research deals with working with DNA samples of MRSA and determining which samples are positive with PVL. By working with DNA, it allows me to complete my research without the hazards of working with the MRSA bacteria.

Procedure:There were three basic ideas behind my testing, they were:
•Primer Design: Create a reverse complement of the target DNA sequence needed in PCR. PVL was the target sequence for my research.
•PCR: Amplifies the target sequence in the DNA of MRSA
•Electrophoresis Gel: Determines if the DNA samples are positive with PVL. If samples aren't positive with PVL, no indication will show in the gel, but it it's positive with PVL, there will be an indication in the gel because the sequence has been amplified billions of times.

Results:The purpose of this project was to detect the distribution of the PVL gene among methicillin-resistant Staphylococcus aureus. A total of 20 MRSA DNA samples were used that had been taken from a variety of 7 nurses, 5 football players, and 8 standard strains of DNA. All samples went through two tests. The two tests showed that 58% (7/12) of the samples were positive with PVL.
There is only one standard strain of MRSA positive with PVL. This strain is called MW2, also known as PVL positive CA-MRSA.
Our DNA samples were from the noses of nurses and football players who were already infected with the MRSA bacteria. Another previous researcher obtained these samples. I never handled the MRSA bacteria. I was provided the DNA of the MRSA by my supervisor.

Conclusion:
If CA-MRSA with the PVL gene is spread among the community, it's understandable that football players who are infected by the same strains of MW2 (CA-MRSA) because they infect each other in the same environment, but how do the nurses get infected with MRSA? PVL positive HA-MRSA has not been reported so far, so there is a high possibility that the nurses with the PVL positive strain received it from the local community or at least outside of the hospital.
There is other research concerning PVL and CA-MRSA, but this is how I plan to expand, improve, and continue my research:
1. Obtain a wider variety of samples: The DNA samples used for this research were all from football players who most likely infected each other. Next I want to obtain samples of MRSA DNA from infected people from different environments within my local community and compare the results from each group.
2. Test mecA: PVL isn't the only factor that makes CA-MRSA dangerous. MecA is just as important in making MRSA hazardous because it's the gene that makes the bacteria resistant to antibiotics.
3. Compare my research with previously conducted research: I want to compare and contrast the work I have done to

research completed in other areas. I'm interested in seeing if factors such as the environment play a role in determining the percentages of people infected with MRSA in one area vs. another.

PROJ# F 9

NAME: Chelsea Arthur **GRADE:** 12

GENDER: Female

SCHOOL: New Prairie High School

PROJECT TITLE: Using Glass as a Catalyst for Diesel Particulate Filters

ABSTRACT:

The objective or purpose of this was to develop a low cost catalyst for use in diesel particulate filters. Alkali metals are known to be effective soot oxidation catalysts, and potassium is the most effective alkali metal. I worked to develop glass compositions with properties specifically tailored for a diesel particulate filter application. To start the experiment I measured out compositions containing different amounts of potassium. After putting the glasses in the furnace, they were milled to a powder of similar particle size. The soot and catalysts are mixed and then put in a TGA machine to perform combustion/oxidation tests. Using software, the data is analyzed and put into graphs. To test the stability of the glass, PH tests were performed. The glass was immersed in 100ml of water and stirred using a stirring rod and stir plate. The PH value changes were monitored using a PH meter. The PH changes are correlated with ion-exchange and shows how stable glass is, depending on the rate that the PH changed.

The more potassium the glass contained, the higher the catalytic activity. The glasses containing high amounts of potassium were too unstable but did bring the oxidation temperature for the soot to the low desired temperature range. The glasses with lower amounts of potassium did not lower the oxidation temperature enough to be effective, but they were stable. The best glass catalyst filter would be an optimization of the K.5 glass and K.7 glass. Optimizing these glasses would be done for future research.

PROJ# F 10

NAME: Jackson Troxel **GRADE:** 12

GENDER: Male

SCHOOL: La Crosse Elem & High School

PROJECT TITLE: Investigating How Traits of Soybeans Relate to the Yield

ABSTRACT:

Soybean yield data is published by different seed companies and different Universities every year. When evaluating the data, it becomes apparent that certain varieties out yield other varieties in one plot, but not in another plot. Understanding the different variables associated with creating these disparities among the yields of different varieties would be very interesting to learn about.

With my farming background, I understand some of the variables that affect soybean yield such as the amount of rain, the timing of the rain, and the temperature trends during different parts of the growing season. Then there are different variables associated with planting that are a little more in depth. Some of these variables are the time of planting, the distance between the rows of plants, ground preparation, proper seed spacing, and the nutritional content and type of soil.

Although I do not have the facilities, expertise, or time to significantly evaluate all these parameters, I worked with the Purdue research team at Pinney Purdue to understand their procedures. The directors of the Purdue research farm shared their yield data with me so that I would have a reference to compare with my results.

In my research, I took samples of thirty soybean plants from thirty different test plot varieties. After collecting the samples I counted the number of pods per node on each plant. I also researched the number of soybeans in each pod of the entire variety by counting the total number of pods with one, two, three, and four soybeans. To find the average size of the soybeans, I cracked open the shells of the soybean pods, removed the beans, and then weighed the beans. The average size was determined by dividing the number of beans by the weight of the sample. The weight was also used to calculate the yield.

While collecting the samples from Pinney Purdue Research Farm, I measured the row width and length that the thirty plants took up. From that information, the total number of plants per acre can be calculated. Using the weight and area of the sample, the yield was calculated. The yield calculated by the aforementioned method was compared to the yield data supplied by the directors of the Purdue Research Farm.

Although I understood some of the factors affecting soybean yield prior to collecting my data, I have developed a base of knowledge that has given me a greater grasp on the subtle aspects of the traits of different varieties. By using my data, I can explain what traits are creating the yield differences between varieties.

PROJ# F 11

NAME: Thomas Dauer **GRADE:** 9

GENDER: M

SCHOOL: Castle High School

PROJECT TITLE: A Novel Method for the Construction of an Internal Reaction Drive

ABSTRACT:

For several years, NASA supported the Breakthrough Propulsion Physics Program, a major goal of which was to construct an Internal Reaction Drive (IRD), a drive that does not eject fuel or react with its surroundings. This experiment, A Novel Method for the Construction of an Internal Reaction Drive, was done to test the viability of a Center Of Percussion (COP) based internal reaction drive. The idea behind this drive is that angular momentum is effectively converted to linear momentum when a rotating pipe's COP hits a firmly held rod, since the tangential force at the pipe's axis is zero at the moment of the impact. If the pipe and rod were on the same wheeled cart, then the cart should theoretically constitute an IRD that can pass the pendulum test. Several experiments designed to reveal the underlying physics principles involved in such a drive were done, ultimately leading to the construction of the COP-based IRD itself. This IRD passed a watered-down version of the pendulum test. However, the average distance that the IRD caused the pendulum to move was small. Factors that could have yielded erroneous results were thoroughly investigated and found to be negligible; however, future research involving the construction of a COP-based IRD that will pass the pendulum test for a continuous period of several seconds must be done in order to establish the ultimate validity of the COP-based IRD concept.

PROJ# F 12

NAME: Brennan Chung **GRADE:** 10

GENDER: Male

SCHOOL: Terre Haute South Vigo High School

PROJECT TITLE: Free Energy? Part II

ABSTRACT:

This project incorporates engineering design with concern for the environment to harness free energy from the wind. Multiple propeller designs were created, built, and tested to determine the one that would generate the most power output per unit weight. The 4 blade angled propeller by far generated more power output per gram than any of the other blade designs tested. This blade generated enough energy alone to power a small electrical device.

Inventor, a 3D CAD program and a Rapid Prototyper were used to design and make sample propellers to test. Each propeller was mounted on a motor and placed in a small wind tunnel. The motor was connected to a computer and the output for voltage and amperage were recorded. The 4 blade propeller operated at 5225 RPM and generated 0.63 watts.

Two different configurations were tested to determine how turbulence affects the power output at different distances. One configuration contained 2 to 9 propellers equally spaced on an aluminum rod and connected to a single motor. The additional weight and turbulence from the blades being close together worked negatively on the power output. The second configuration consisted of two propellers each attached to a motor that were spaced at various intervals. Connecting propellers on individual motors spaced a distance over twice the propeller diameter generated a normal power output and no turbulence.

Energy from the wind could be harnessed by designing a propeller that would generate the most power per unit weight. If properly spaced in application to avoid turbulence from other blades, the power output would easily power electrical devices.

PROJ# F 13

NAME: Tony Huang **GRADE:** 9

GENDER: M

SCHOOL: F.J Reitz High School

PROJECT TITLE: Effects of Temperature on Resistors

ABSTRACT:

Abstract:
Resistors are used in order to create voltage drops in electrical circuits. Previous literature states that resistance values depend upon temperature. However, the behavior of resistance trends for different types of resistors in response to temperature is not fully understood. The purpose of this experiment was to study the temperature dependence values and trends of various resistors. Four types of resistors with different ohm values were used in this experiment. Resistors were submerged in various chemical slush and vapor baths ranging from -195.79℃ to 218℃. Resistance was measured by a digital voltmeter after equilibrium was reached in the baths. Alpha and beta values, which are temperature coefficients of resistance, were determined for each resistor. Results showed that these resistors had a relatively small resistance change in response to a temperature range of 413℃. Most of the resistors showed trends with significant second-order behavior and a negative alpha temperature coefficient. This observed behavior was possibly influenced by the composition and ohm values of the individual resistors. The results of this study may be useful in understanding the relationship between temperature and resistance. Furthermore, this data could be applied to determine the most effective resistors in low temperature applications, as well as to investigate how to further improve resistor stability.

PROJ# F 14

NAME: Frieda Fein **GRADE:** 11

GENDER: Female

SCHOOL: Adams High School

PROJECT TITLE: Investigations of Faunal Diets at Pokagon Village Site to Determine Farming Practices of the Pokagon Band circa A.D. 1830

ABSTRACT:

This study compares the isotope ratios of a variety of domesticated and wild animal bones in order to determine the animals' diets and the extent to which they were domesticated by the Pokagon Band of Potawatomi Native Americans (circa A.D. 1830). During the Removal Period, from A.D. 1795 until 1840, the American government forced most Midwestern Native American tribes off of their traditional lands and onto reservations in western United States. The Pokagon Band was one of a few tribes that were able to avoid removal, perhaps because of their willingness to adapt to an American pioneer lifestyle, raising crops and domestic animals. Though excavations of the Pokagon Village site revealed bones of traditionally domesticated animals (cows, pigs, and chickens), there is a spectrum of domestication, and it is unclear where on this spectrum the Pokagon domestic animals fall. These animals may have been left to forage for themselves as though they were wild, and then hunted when needed.

This experiment compares the stable carbon isotope ratios of both wild and domesticated animal bones found at the Pokagon site in order to determine the amount of maize in the animals' diets. More maize suggests a more domesticated lifestyle, in which humans were feeding the animals surplus crops. To determine the isotopic ratios, samples of the bone collagen from each animal bone were isolated using sequential HCl and NaOH treatments. The collagen was analyzed using an isotope ratio mass spectrometer. The results show that domesticated animals had diets much higher in corn than the wild animals, suggesting a high extent of domestication and that the Pokagon Band followed farming practices typical of the American settlers. This study provides insight into strategies used by Native Americans to resist removal from their traditional lands.

PROJ# F 15

NAME: Tanisha Howard **GRADE:** 9

GENDER: Female

SCHOOL: West Side High School

PROJECT TITLE: "What are the resistance patterns of Escherichia coli and Streptococcus lactis?"

ABSTRACT:

This project in its present form is the result of microbiological experimentation on the resistance patterns of Escherichia coli and Streptococcus lactis. The initial idea was to determine the number of generations required for antibiotic resistance to develop in Streptococcus lactis. The rapid development of antibiotic resistance led to use of Escherichia coli and Streptococcus lactis as the test subjects. It was hypothesized that resistance would occur in the Escherichia coli and the Streptococcus lactis in 10 days, a typical regimen of antibiotics prescribed to human subjects.

Resistance was determined by measuring the zone of inhibition. Escherichia coli and Streptococcus lactis were used as test bacteria. Resistance was determined by the lack of bacteria growth around the antibiotic. The initial measurement of the zone of inhibition for Streptococcus lactis exposed to Tetracycline was 10.5 mm after 72 hours. The initial measurement of the zone of inhibition for E. coli exposed to Tetracycline was 10 mm after 72 hours.

After 3 generations, the zone of inhibition is practically nonexistent. It has also been observed that the elapsed time between the original culturing and the conclusion of the experiment, the bacteria developed a resistance and the zone of inhibition disappeared.

The practical applications of this project are that inside of every person, there are relatively large amounts of harmless bacteria. Over time, the bacteria can develop a resistance to the antibiotic, thus causing negative side effects. This validates research done that confirms the dangers of excessive use of antibiotics .

PROJ# F 16

NAME: Lauren Jessup **GRADE:** 12

GENDER: Female

SCHOOL: Marian High School

PROJECT TITLE: Synthesis of Thiazoline-Based Antibacterial Agents

ABSTRACT:

Thiazoline is a pentacyclic compound that contains one sulfur and one nitrogen atom and a single double bond. Thiazoline-based compounds have been synthesized in the past to treat hemochromatosis; however, this is one of the first time that thiazoline based compounds will be tested to observe antibacterial properties. In order to do this, a thiazoline-based core compound, is synthesized using by reacting cystine and benzonitrile. Next, the core compound is chlorinated to form an acid chloride. Then, other tail compounds are added on to the acid chloride in order to increase the compounds reactivity to various bacteria. The resulting compounds are then be tested by an agar diffusion assay against bacteria to see if the thiazoline-based compounds are effective at killing harmful bacteria. Some of the bacteria that the thiazoline-based compounds have been tested against are Staphylococcus aureus ATCC11632, Escherichia coli X580, Pseudomonas aeruginosaK799/WT, Pseudomonas aeruginosaK799/61 Mycobacterium vaccae IMET 10670, Mycobacterium luteus ATCC 10240, and Bacterium subtilis ATCC 6633. The compound which combines of the base compound and tail proved to have reactivity against Escherichia coli X580, Pseudomonas aeruginosaK799/WT, Pseudomonas aeruginosaK799/61, and Bacterium subtilis ATCC 6633. Therefore, through this research, it has been proven that thiazoline based compounds can be synthesized and these compounds are reactive against bacteria. Research is currently ongoing and the thiazoline-based compounds will next be converted into thiazole-bases to see if there is increased reactivity.

Hopefully, the thiazoline-based compounds will be effective in fighting one or more than one of the bacteria that it is tested against. If this is the case, and if the compound is not toxic to humans, it would be possible for that thiazoline-based compound to be used as an antibiotic. This would be beneficial because many of these bacteria have become resistant to the current drug therapies that are used to treat them. However, if one or more of these compounds could be used as an antibiotic, it is possible that it could be used in order to treat the multi-drug resistant strands of the bacteria, and assist thousands of people who otherwise have very few treatment options. It is likely that the thiazoline-based compounds will be effective against multi-drug-resistant strands of bacteria because the base thiazoline compound has not been used as an antibacterial base before now. Therefore, these multi-drug-resistant bacteria have not had the opportunity to develop resistance to this class of antibacterial agents.

Therefore, it is believed that it will be possible to synthesize thiazoline-based antibacterials, which will be effective at killing harmful bacteria such as Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Mycobacterium vaccae, Mycobacterium tuberculosis, Mycobacterium smegmatis, and Candide albicans.

PROJ# F 17

NAME: Kristen Kirkland **GRADE:** 11

GENDER: Female

SCHOOL: Eastern High School

PROJECT TITLE: Using X-ray Fluorescence Analysis to Identify the Chemical Composition of Lichens on Dead and Living Trees in Relationship to Tardigrade Proliferation

ABSTRACT:

Previous research projects conducted by this researcher concluded that tardigrades did not habitat lichens collected from dead trees. This unique discovery lead to the inevitable question, “Why?” The purpose of this project was to identify the chemical composition of lichens from dead and living trees to determine its potential role in tardigrade proliferation. It was hypothesized that there would be a distinct difference in the chemical compositions of lichens taken from dead and living trees. Three samples of foliose lichens (and their attached bark) were collected from each of three dead maple trees and three living maple trees. The lichen samples were meticulously separated from their attached bark for individual testing. The four samples (lichen/living, bark/living, lichen/dead, and bark/dead) were analyzed using a Niton X-ray Fluorescence Analyzer to determine the chemical composition. Each test was conducted three times. Energy from the x-rays ejected inner-shell electrons from their orbits and electrons from the outer shell took their place. This energy resulted in fluorescent x-rays, each of which was characteristic of a specific element. The fluorescent x-rays were detected and elements present in parts per million were identified. F-tests and Student’s t-Tests were conducted on eight different elements for each of the four samples and their averages to determine the statistical significance. Not only were the elements with obvious differences in larger quantities analyzed, so were the elements in minute quantities with large ratio difference.. These tests showed that Iron, Strontium, Manganese, Copper, Calcium, Potassium, and Zinc were all statistically significant at the 0.05 level.

PROJ# F 18

NAME: Demetrius Murphy **GRADE:** 10

GENDER: Male

SCHOOL: West Side High School

PROJECT TITLE: Spontaneous Renaturing vs. Chaperone Assisted Renaturing of Myoglobin

ABSTRACT:

This project in it present form is the result of questions about protein folding of myoglobin. The initial idea was to see if the pH of myoglobin was altered would it be able to return to its original conformation. Spontaneous refolding was compared to chaperone assisted refolding. The problem was to determine which is more efficient, spontaneous refolding or chaperone assisted refolding. It was hypothesized that chaperone assisted refolding would be more efficient than spontaneous refolding.

Efficacy was determined by measuring the optical density of myoglobin at different pHs to compare it to the optical density of the control, a solution of myoglobin and buffer. Data was collected by comparing spectrographs for each variable.

The practical applications of this research project are that in every person there are numerous denatured or improperly folded proteins. Understanding how proteins fold, unfold, and refold can open the doors to curing numerous of diseases related to the misfolding of proteins such as sickle cell anemia.

PROJ# F 19

NAME: Jonathon Nance **GRADE:** 11

GENDER: male

SCHOOL: Noblesville High School

PROJECT TITLE: Aerobird II

ABSTRACT:

Sweep Theory has been under controversy in the aerospace industry in that forward swept wings possess significantly higher lift-to-drag ratios and the ideal stalling point that allows for a higher angle of attack than traditional wings. However due to the severe aeroelastic divergence experienced at the wing tips, forward swept wings have been deemed impractical at most angles. Rear swept wings do not undergo such extreme divergence problems due to the wingtips placement behind the center of pressure and a better efficiency of the precession of air circulation. To solve this problem both sweep angles could be combined in a manner similar to a soaring bird planform. This new aeroelastic divergence conscious design should benefit from the same or better lift to drag ratio.

Testing of this design must be done in a wind tunnel at subsonic speeds for the divergence issue only arises at subsonic speeds. The new design has two variations while the forward swept wing has two angles. All designs plus a control must be tested in a wind tunnel.

Data analysis revealed a conclusive lift-to-drag ratio per inch squared advantage in the new wing design over the forward swept wing. Thus, these results have proved that the new design that combines both angles has not only matched the lift to drag ratio, but has exceeded the ratio. These results have the potential to offer a solution to the problems of sweep angles without sacrificing all the benefits of both angles of sweep.

PROJ# F 20

NAME: Timothy Rominger **GRADE:** 9

GENDER: M

SCHOOL: Lighthouse Christian Academy

PROJECT TITLE: What is the effect of Lamination on Material Strength

ABSTRACT:

In this experiment, the effectiveness of lamination on material strength was determined by using several different material combinations that include: how the wood is assembled (laminated or non-laminated), the thickness of the wood, and the direction that the force is applied on the wood (parallel or perpendicular to the grain). The breaking point of the wood was determined by the application of a constant force machine. I inferred that the two ply glued with the force applied perpendicular to the grain would perform the best out of all the possible combinations of two ply. I found that one ply with the force applied perpendicularly to the grain was many times stronger and harder to break than when the force was applied parallel to the grain I found that lamination does increase the breaking point with the force applied parallel to the grain. In conclusion, the results strongly confirmed my hypothesis that the laminated two ply with the force applied along the grain would be the strongest out of the other combinations of two ply. Lamination did have an effect on the material strength with the force applied along the grain. It did have an effect when the force was applied perpendicularly to the grain, but I was not able to break it due to system limitations.

PROJ# F 21

NAME: Rafid Mustafa **GRADE:** 12

GENDER: Male

SCHOOL: Carroll High School

PROJECT TITLE: Effects of turmeric as a nutraceutical in the modulation of stress and immune response in farmed fish

ABSTRACT:

Stress is a major problem in intensive fish farming systems. Stress from crowding, transport, grading, vaccinating, poor water quality, and sub-optimal nutrition lead to poor physiological adaptations, decreased growth, and increased susceptibility to infectious diseases. In order to prevent such diseases, fish in farms are often treated with chemical baths, pharmaceutical drugs, and vaccines. However, these treatment methods can be costly, dangerous, and detrimental to other non-target species and the environment. Recently fish farmers have started to use nutraceuticals to combat the introduction of diseases and in turn grow larger, healthier fish.

In the first year of this research, turmeric was proven to enhance immune response in animal models. A 700% increase in the lymphocyte counts was found in the spleen of young mice, in-vitro. In this year's research, the effects of turmeric as a nutraceutical to improve the overall immune system of animals was uncovered, in-vivo. In particular, this year's research presents, apparently, the first evidence that turmeric reduces the physiological stress and improves the immune response in fish in the farming environment. Application of these findings, if used, will maximize the dependecny of fish farmers on the usage of chemicals as medications and maximize the economics of the farming systems. This in turn, will keep the environment safe and will provide cheap yet good quality protein for human consumption.

J

PROJ# J

NAME: Shan Patel

Alex Barksdale

GRADE: 8

GENDER: Male

SCHOOL: Honey Creek Middle School

PROJECT TITLE: Are dandelion and other natural herbs as effective as commonly prescribed antibiotics?

ABSTRACT:

In our project we tested dandelion along with different herbs. We wanted to test these herbs against the inhibition of common gram negative and gram positive bacteria against Ampicillin for antibacterial properties. We inoculated several agar plates with three bacteria, made holes in the agar and used 75 milliliter of each substance to test for an we measured the antibacterial properties. We then incubated the cultures overnight at a constant 37 degrees Celsius. The next day we measured the diameter of the zone of inhibition. Although we expected at least some resistance to the bacteria, our results were surprising. Dandelion didn't show any properties of being antibacterial at all, as well as another substance, cedar wood oil. Ampicillin was able to inhibit growth with Staphylococcus Aureus and Escheria coli while no signs of inhibition were detected on pseudomonas aeruginosa. Eucalyptus oil was also able to resist with Staphylococcus Aureus and Escheria coli, as well as nutmeg oil, but each with less effectiveness than ampicillin. Even though they do have antibacterial properties, dandelion, and other natural herbs were proven not to be as effective as antibiotics.

PROJ# J

NAME: Katherine Will
Will Niegodski

GRADE: 7

GENDER: female

SCHOOL: St. Jude Catholic School

PROJECT TITLE: Is Brown the new Green?

ABSTRACT:

This project in its present form is the result of the combustibility and sustainability of manure. The initial idea was to test manure as an alternative energy by creating and using a calorimeter. The failures and successes have lead to the testing of manure's best properties.

The decision of which manure would be the best alternative source of energy for the project was based on the amount of joules (the universal measurement of energy) calculated for each sample of manure. The temperatures and amounts of water were used to determine the total amount of joules. This measurement showed the largest difference in the results of all the tests.

Both the diets and the digestive systems of the llama and horses affected the results of this project. This conclusion was used to base the hypothesis for the experiment. With this information it was concluded that the characteristics of the manure affected the results. Observations were made that the horse manure did not reach above 82.8℉ because of the difficulty catching a flame. The llama manure was more successful of the two manures reaching a high of 123.3℉.

With all of this in mind the project had a reasonable outcome that could be changed depending on how the methane gas could be concentrated. The outcome was that the llama manure performed the best out of the manures tested but did not compare with the control, wood chips.

PROJ# J 1

NAME: Sarthak Aggarwal **GRADE:** 5

GENDER: Male

SCHOOL: Michael Grimmer Middle School

PROJECT TITLE: Insulating Properties of Various Materials

ABSTRACT:

Insulating homes needs expensive material during extreme of weather to save energy but low cost recycle material may be used by poor

Hypothesis: Common recycle materials will have insulating ability. Commercial insulation will insulate home better than these other common recycle materials because commercial insulating material is in use and is known to be effective

Procedure: A small cardboard box was inserted into a slightly bigger box to simulate home and the insulating space of house wall. This space was filled with different test insulating material (Commercial insulation, Thermacole, Plastic bag, and paper) to compare their insulating ability. First as the temperature of outside environment, in which the cardboard box was kept, was increased using incandescent bulb from the initial temperature of 17 degree Celcius (oC), the inside of cardboard box temperature was recorded every 2 minutes for 20 minutes. Second inside box was initially warmed to 60 oC and then temperature drop was noted every 2 minutes for 20 minutes keeping outside temperature at 17 oC. For each material 3 trials of readings were taken. Data was collected and compared

Result: Temperature inside the box increased after 20 minutes of observation to 31 oC for commercial insulation, 38 oC for thermacole, 39 oC for paper, 44 oC for plastic bag and 60 oC for air from 17 oC at the start of the experiment. During cooling inside temperature decreased from the starting temperature of 60 oC to 32 oC for commercial insulation, 30 oC for thermacole, 27 oC for paper, 25 oC for plastic bags and 22 oC for air at the end of 20 minutes of observation. The materials tested offer good insulation in the following order in both set of experiment Commercial insulation, Thermacole, Paper, Plastic bag, Air

Conclusion: Recycle materials tested have insulation ability. Commercial insulation material is best to insulate home, insulation offered by tested recycle materials is much better than no insulation

PROJ# J 2

NAME: Renee DiNino **GRADE:** 5

GENDER: Female

SCHOOL: Hal E Clark Middle School

PROJECT TITLE: The Rising Power of Baking Soda

ABSTRACT:

The purpose of this experiment is to determine if adding more baking soda will cause cookies to rise higher.
The procedure includes the following steps: First, follow one half batch of the Nestle Toll House Cookies. Next, mix the batter three times, one with out baking soda, one with the right amount, and one with triple the amount of baking soda. Bake them for 11 minutes. After the cookies cool, measure the height of the cookies. Last, compare the heights of all the cookies and record the results.
Data/ Results: Cookie A (no baking soda) was the highest and did not cook well. Cookie B (the right amount of baking soda) cooked perfectly. Cookie C (no baking soda) flattened and burned.
Conclusions: The results showed that Cookie A did not cook fully because it did not have any baking soda. Baking soda causes a chemical reaction. The chemical reaction is when baking soda causes air bubbles to form inside the cookie. Cookie B cooked perfectly because it had the right amount of baking soda. It rose and then spread out to cook evenly. Cookie C flattened and burned because it had too much baking soda. This caused bigger air bubbles to form and pop, causing the cookie to spread too thin and burn.

PROJ# J 3

NAME: Drew Ellery **GRADE:** 5

GENDER: Male

SCHOOL: Royerton Elementary School

PROJECT TITLE: Testing the Launch Distance of a Trebuchet

ABSTRACT:

Purpose and Hypothesis: The purpose of my study was to find out how far a trebuchet could launch an object under different conditions. In this study, I looked at the counterweight used to throw the object, the weight being thrown, and the length of the sling attached to the weight. I thought that the longer the sling, the heavier the counterweight, and the lighter the object being thrown, the farther the object being thrown would travel. Procedure: First, I tested three counterweights of 226 grams, 454 grams and 682 grams for throwing a 20 gram object using a 3.2 cm sling. Each weight was tested 3 times and the average distance for each counterweight was recorded. Then, I tested three different sling lengths of 3.2 cm, 7.0 cm, and 11.4 cm using a 20 gram object and a counterweight of 230 grams. Each sling length was tested 3 times and the average distance for the object that was thrown was recorded. Finally, I tested 3 different object weights of 20 grams, 38 grams, and 58 grams. Each weight was tested three times and the average distance for each weight was recorded. Data: From the tests that I did, I found out that the heaviest counterweight and the lightest object traveled the furthest as I predicted. However, I found that the shorter the sling length, the farther the object traveled. This was against my hypothesis and surprised me.

PROJ# J 4

NAME: Lauren Engelbrecht **GRADE:** 6

GENDER: Female

SCHOOL: Hal E Clark Middle School

PROJECT TITLE: Searching for Stereotypes

ABSTRACT:

I wanted to know if there was any truth to stereotypes of males and females. To determine this, I tested males and females using words that are common to men and women. I wrote each masculine and feminine word on a separate page. I showed the subjects the masculine words one at a time. After they read all of the words out loud in that packet, I game them one minute to write as many words as they could remember. After we were done with the masculine words, I did the same with the feminine words. I repeated this process on 15 men and 15 women. I checked their answers to make sure they wrote down the correct words and to see how many words they remembered. I entered all of their answers in a worksheet. I entered a 1 for a correct word and a 0 for an incorrect word or word they did not write. I found that the men in this test remembered an average of 30% of the feminine words while females remembered an average of 38% of the same words. I also found that the men remembered an average of 33% of the masculine words while females remembered an average of 39% of the same words. According to the data collected, med did remember more masculine than feminine words, women remembered the same amount of masculine and feminine words, and women did remember more masculine words than did men remembering feminine words.

PROJ# J 5

NAME: Abigail Erickson **GRADE:** 5

GENDER: Female

SCHOOL: Madison Elementary School

PROJECT TITLE: Using Protease Enzymes to Dissolve Trichobezoars

ABSTRACT:

Purpose: To determine which cysteine protease tested would break down rabbit wool the best. Of the five products tested, I hypothesized that adding “Super Enzymes” tablets to the wool solution would cause the most reduction in mass (dissolve the most wool).
Procedure: Thirty vials filled with angora rabbit wool were weighed and recorded. Five control vials were filled with white vinegar. Twenty-five vials were filled with white vinegar and a protease (5 vials each of Super Enzyme, Papaya-Zyme, Bromelain, Fastrack, and Chewable Acidophilus). Vials were kept in a warm water bath for 48 hours then removed, contents drained and then allowed to dry. Weights were then taken again and recorded.
Summary of Results: The data showed that “Fastrack” caused the most loss in mass, followed by “Acidophilus”, “Super Enzymes” and “Papaya-Zyme”. Bromelain tablets had the least effect on the mass of the wool.
Conclusion & Application: The data shows that the hypothesis was incorrect. “Super Enzymes” tablets did reduce the mass of the wool, but did not reduce it as much as the “Fastrack” product did. “Fastrack” should be fed to wool breed rabbits on a regular basis to reduce the risk of wool block and could also be used to treat wool block.

PROJ# J 6

NAME: Margaret Feighery **GRADE:** 6

GENDER: Female

SCHOOL: Saint Anthony De Padua School

PROJECT TITLE: The Effect of Sugar on Mouse Memory

ABSTRACT:

In my experiment, I tested whether or not sugar affects a mouse's memory. I am looking to see if a mouse that consumes sugar memorizes a maze better than one that doesn't. To conduct my experiment, I first needed ten lab mice. I then split them into two groups of five, groups 1 and 2, and gave one group (group 2) three tablespoons of sugar in their water to maintain their water-soluble diet. I took away each groups food for twelve hours, but fed each mouse two boiled rice grains to familiarize them with the food being given to them as a reward. After the twelve hours was up, I put each mouse through the maze for trial A, and marked their backs with a number so I wouldn't get any of them mixed up. I timed each mouse then averaged the times in each group. I waited twelve hours, put each mouse through again in the same order, took their times, and averaged each groups times to see which one had a larger difference in times between trial A of running through the maze, to trial B. My hypothesis was that the mice that consumed sugar would have more trouble remembering than the ones that don't. I predicted this because mice are often used as testing animals for the effects products may have on us. Since sugar tends to make our brains agitated, losing our focus, i thought it may have a similar effect on the mice. My results proved my hypothesis correct, with group 1 only increasing their time by about nine seconds from trial a to trial b, while group 2 more than doubled theirs.

PROJ# J 7

NAME: William Fryear **GRADE:** 6

GENDER: male

SCHOOL: Christ the King Catholic School

PROJECT TITLE: How Temperature Effects Magnets

ABSTRACT:

My experiment was designed to look at how changes in temperature can effect a magnet's magnetism. I tested how many BBs a magnet picked up at room temperature, and then varied the temperature by heating in the oven, refrigerating and freezing in the freezer. I retested them after they returned to room temperature to see if any changes were permanent. I concluded that temperature does indeed effect a magnet but the effect is not permanent at the temperatures tested.

PROJ# J 8

NAME: Ethan Heikens **GRADE:** 6

GENDER: male

SCHOOL: Custer Baker Intermediate School

PROJECT TITLE: De-icers: Friends or Foes?

ABSTRACT:

De-icing salts are frequently used to melt snow and ice, but are known to be harmful to the environment. I measured the rate of photosynthesis in aquatic plants by counting the number of oxygen bubbles released to determine the effect of the de-icing salts on the plants. I discovered that all three of the de-icing salts tested (calcium chloride, sodium chloride/calcium chloride blend, and the eco-friendly blend) dramatically decreased the rate of photosynthesis of the aquatic plants. The eco-friendly blend was as harmful to the plants as the more popular de-icers. Although de-icers melt ice from sidewalks and driveways, according to my experiment these salts should be used with caution around vegetation.

PROJ# J 9

NAME: Emily Hoffer **GRADE:** 8

GENDER: F

SCHOOL: Our Lady of Perpetual Help

PROJECT TITLE: Magic Eraser.

ABSTRACT:

I am trying to answer the question of whether water, vinegar, or alcohol will erase permanent marker better then each other and if the brand of marker makes a difference. My hypothesis is that the alcohol will erase the marker better than the water or vinegar will and that the brand of marker does not make a difference. I performed my experiment using a spring scale and applying the same amount of force to rub on two different brands of marker lines, Sharpie and the generic Staples brand, with all three solvents. I then labeled the amount of fading on a scale from 1-10; one being no change and 10 being completely vanished. The results of my experiment showed that my hypothesis was supported in one instance but not in the other. It was supported when the alcohol did work better than the water and the vinegar. The water and vinegar left all three trials with ones because they made no difference. The alcohol, however, left the Sharpie marker with a nine and the generic brand with a ten, meaning I could not see any of the line. My hypothesis was not supported in that the brand of marker does play a part in the strength of the ink. The brand name Sharpie marker was stronger against the alcohol as a solvent than the generic brand was. My results were the same in all three trials.

PROJ# J 10

NAME: Susan Hubbard **GRADE:** 6

GENDER: Female

SCHOOL: Lafayette Christian School

PROJECT TITLE: Does Temperature Affect Coca-Cola Fizz?

ABSTRACT:

The purpose of this project was to test what effect temperature had on Coca-Cola fizz (effervescence) and on the air pressure of a new bottle of Coca-Cola. My hypothesis was that the higher the temperature, the more air pressure and fizz (effervescence) there would be. I formed this hypothesis based on how molecules respond to heat and cold. I tested this hypothesis using two experiments. In the first experiment, I measured the air pressure as the Coca-Cola got warmer. In the second experiment, I measured the amount of visual fizz (effervescence) for three bottles of Coca-Cola at three different temperatures. The results of these two experiments showed that at higher temperatures, Coca-Cola has a higher air pressure and more fizz (effervescence). The results supported my hypothesis, and confirmed that there is more fizz (effervescence) and a higher air pressure for a new bottle of Coca-Cola at a higher temperature.

PROJ# J 11

NAME: Caleb Anders **GRADE:** 6

GENDER: male

SCHOOL: Sand Creek Intermediate School

PROJECT TITLE: Contaminant Schomtaminant: Do Soil contaminants matter?

ABSTRACT:

Purpose
My purpose is to test how the pH level of contaminanted soil is different from the pH of clean soil and to measure the effect of the contaminants on plants.

Problem
1. Which common Indiana contaminant causes the most pH change to non-contaminated soil?
2. What type of contaminant will have the greatest effect on plants?

Hypothesis
1. I think that the pH level of the soil from under the paint can at the old dump will change the most.
2. I think that coal will affect the plants the most.

Procedure
-Collected soil in Connersville, Indiana from three different contaminated locations and tested the contaminants with a soil test kit.
-I planted the radish and ryegrass seeds into potting soil and the same contaminates that I collected on them. The plants were watered every night except on each fifth night and measured them at the same time each day for fourteen days.
-Next, I planted radish and ryegrass seeds into sandy soil, red clay soil, and loam and put the same contaminants above on them. the plants were watered every night except every fifth and measured them at the same time each day for fourteen days.
-Then, I transplanted existing radish plants I planted earlier into soil I contaminated like above. The plants were watered every night except every fifth and measured them at the same time each day for seven days.
-The next step was to put radish and ryegrass seeds on wet paper towels and placed them into bags. I watched them grow and measured them at the same time each day for seven days.
-Finally, I collected contaminated soil and control soil from the same three places as number 1. I tested them again using a soil test kit.

Conclusion
1. My data supports my first hypothesis. The average pH level change from that site was 1.25, which is almost double any other contaminate.
2. My second hypothesis was incorrect. In all of the experiments only one of the plants or groups of seeds contaminated with oil grew. That plant was not healthy and quickly developed yellow blotches. Three of the groups of seeds contaminated with coal grew, but then died.

PROJ# J 12

NAME: Edward Hunckler **GRADE:** 8

GENDER: Male

SCHOOL: Saint Matthew Cathedral School

PROJECT TITLE: Airfoil Attack

ABSTRACT:

Research: As the angle of attack of an airfoil increases, the lift also increases until it reaches the maximum lift. After this point, the wing can dangerously stall. Airfoils of different designs create the maximum lift to either increase or decrease. One type of airfoil design is NACA four-digit airfoils, which are the type that were used in this experiment. There are different terms in describing an airfoil. The chord is “the width of an airfoil from leading to trailing edge.”

Hypothesis: By measuring different angles of attack on the airfoils and finding the maximum lift of each, the maximum lift of an airfoil will increase as the thickness to chord ratio increases.

Purpose: The purpose of this experiment is to find if the maximum lift increases as the thickness to chord ratio of an airfoil increases. This is important to know because the more efficient the wing is, the less fuel an airplane needs to use. The efficiency of an airfoil is determined by the amount of lift created and least amount of drag created.

Procedure:
□1. Create five airfoils with the NACA four- digit combinations of 0003, 0006, 0009, 0012, and 0015 by printing off the coordinates on the computer and tracing them on the Styrofoam.
□2. Cut and sand the airfoils so they have a chord length of 14 cm and a width of 5 cm.
□3. Draw the chord line down the side of the airfoil and mark the point one-fourth of the way to the front.
□4. Make wooden blocks 1 cm x 1 cm x 5 cm and balsa wood strips 1 cm x 6 cm and attach two balsa wood strips by the end to the blocks.
□5. Connect the paper protractor and push the pins into each side at the top.
□6. Make the wind tunnel with an air duct with a hole cut 13 cm x 6 cm, and Plexiglas □covering it.
□7. Make a long board to mount everything on and two small boards with half circles cut out of them to support the tube.
□8. Place the scale and a plywood platform underneath the tube and have a dowel from the □platform to the inside of the tube.
□9. Screw down the screw and fan.
□10. Test the airfoils by setting the angle to 0˚.
□11. Place the wing inside and push zero on the scale.
□12. Turn on the fan to power level three, and record the lift in grams.
□13. Repeat this process for the angles: 0˚, 5˚, 10˚, 15˚, 20˚, 25˚, 30˚, 35˚, 40˚, 45˚, 50˚, □□and 55˚.
□14. Repeat and record again for each airfoil.

Results: Each of the wings were tested and recorded, and the results showed that as the thickness to chord ratio increased the lift also increased. The following airfoil designs had these maximum lifts: 0003 = 3.308, 0006 = 3.416, 0009 = 4.089, 0012 = 4.108, and 0015 = 4.111.

Conclusion: In my project, my results supported my hypothesis. Because the thickness became greater, the airfoil created more lift. I learned about the NACA four-digit airfoil design and how it is important to make accurate wings. If I were to repeat my project, I would test different wing designs and possibly have camber, or a curve, in my wing.

PROJ# J 13

NAME: Trevor Hundley **GRADE:** 8

GENDER: Male

SCHOOL: Frankfort Middle School

PROJECT TITLE: Paper or Computer?

ABSTRACT:

Is reading comprehension affected by the source the test is read and taken from? That is the question I set out to answer with this project. I think that the scores on a test taken from paper will be better than the one on the computer. This is because most students are used to taking a test using paper and pencil, so their minds will immediately get into the mindset of "We are taking a test." I started this experiment by finding a practice I-Step reading comprehension test. I made copies for both a pencil and paper test and the computer using Q-Basic. I wrote the program to give the test. I then administered both tests to two different groups of eighth graders. Finally, I gathered data and then compared results. When I found the mean number of correct answers for the two groups, they were very close to each other. In fact, rounded down, they would be the same score. So, I ran a t-test on the two groups to see if that small amount meant that the paper group did in fact do better than the computer. After running a t-test, I found that it scored in the 94th percentile. This is close enough to the wanted 95th percentile that it would allow me to say that this small difference in scores is significant and that it was caused by my variable and not the other several factors that are involved with testing humans. My conclusion is that the paper test group really performed better.

PROJ# J 14

NAME: Matthew Lamberti **GRADE:** 7

GENDER: Male

SCHOOL: Christ The King School

PROJECT TITLE: What Causes River Sediments to Erode?

ABSTRACT:

I studied how sediments are eroded in a river. I believe that sediments in rivers erode due to the pressure and speed of the water. My hypothesis had two parts: (1)Higher slope will increase the amount of sediment eroded. (2)Smaller sediments will erode more easily than larger sediments. I used a model stream to manipulate 7 different slopes (0-20%) and 2 different sediment sizes (gravel and sand). My control condition was 0% slope. My response variable was the volume of sediment eroded. My constants were the amount of water I poured through the stream (2 L), the amount of sediment in the stream (50 mL), and the level platform for the stream. In my experiment, I found that more sediment erodes at higher slopes and that higher water velocities carry more sediment downstream. I believe that at higher slope, water applies more force (called “shear”) on the sediment to move it. Sand erodes more easily than gravel. I think this is because sand is lighter and not as solid as gravel. I observed that sand sometimes clumps together, which makes it harder to erode. At higher slopes, all the sediment eroded from my model stream. In a real river, however, sediment that is eroded away would be replaced by sediment from upstream. Rivers are in constant motion and are always moving sediments from one location to another.

PROJ# J 15

NAME: Chase Latour **GRADE:** 6

GENDER: Female

SCHOOL: Klondike Middle School

PROJECT TITLE: Investigation of Duckweed (Lemna) in the Phytoremediation of Zinc

ABSTRACT:

Phytoremediation is the use of plants to remediate (remove contaminants from) soil and water. Duckweed (Lemna) is a small aquatic plant that is often investigated as a good tool for removing contaminants such as metals. Zinc is a metal environmental contaminant associated with mining and smelting operations. It has been associated with organ toxicoses in mammals and birds and with decreased numbers of bacterial species in soil. Researchers have reported that duckweed can accumulate zinc by removing it from water. Here we investigate the time course of zinc removal from water by duck weed. We wanted to know what time point would be optimal for harvest of duckweed exposed to zinc. That is, when does zinc uptake reach its plateau? We hypothesized that zinc uptake would plateau at seven days after first exposure. To test our hypothesis, we exposed duckweed (collected form a local pond) to 10 ppm zinc for 19 days. We harvested samples and controls (not exposed to zinc) at days 3, 7, 11, 15 and 19. Controls and samples were digested using acid and heat. To measure the amount of zinc in the duckweed, we used a zinc Hach kit and spectrophotometry. Using linear regression analysis, we determined the zinc concentration in each plant extract and calculated the man amount of zinc per plant weight at each time point. The data led us to conclude that our zinc levels did not reach a completely flat plateau before day 19. Nonetheless, the data led us to conclude that day 11 is the best day for harvest.

PROJ# J 16

NAME: Joseph Moran **GRADE:** 6

GENDER: Male

SCHOOL: Yorktown Middle School

PROJECT TITLE: Distracted Driiver

ABSTRACT:

The purpose of this project was to determine if distractions decrease video game driving performance. The investigation involved measuring the lap times of 10 different subjects playing Mario Kart with no distractions, having a conversation, talking on a cell phone and texting on a cell phone.
The measurements showed that both talking and texting on a cell phone increased the lap times. The increase in lap times was greater while texting. There was no significant difference between no distractions and having a conversation. The experimental data did support my hypothesis that distractions would decrease video game performance.

PROJ# J 17

NAME: William Niezgodski

Katherine Will

GRADE: 7

GENDER: male

SCHOOL: St. Jude Catholic School

PROJECT TITLE: Is Brown the new Green?

ABSTRACT:

This project in its present form is the result of the combustibility and sustainability of manure. The initial idea was to test manure as an alternative energy by creating and using a calorimeter. The failures and successes have lead to the testing of manure's best properties.

The decision of which manure would be the best alternative source of energy for the project was based on the amount of joules (the universal measurement of energy) calculated for each sample of manure. The temperatures and amounts of water were used to determine the total amount of joules. This measurement showed the largest difference in the results of all the tests.

Both the diets and the digestive systems of the llama and horses affected the results of this project. This conclusion was used to base the hypothesis for the experiment. With this information it was concluded that the characteristics of the manure affected the results. Observations were made that the horse manure did not reach above 82.8℉ because of the difficulty catching a flame. The llama manure was more successful of the two manures reaching a high of 123.3℉.

With all of this in mind the project had a reasonable outcome that could be changed depending on how the methane gas could be concentrated. The outcome was that the llama manure performed the best out of the manures tested but did not compare with the control, wood chips.

PROJ# J 18

NAME: Alyssa Ortiz **GRADE:** 7

GENDER: Female

SCHOOL: Saint John Evangelist School

PROJECT TITLE: As the worm turns

ABSTRACT:

Purpose: The purpose of this project was to find out if air fresheners release pollutants that may be harmful to the environment.

Procedure: Prepare a habitat for the mealworms using a small plastic aquarium. Add three centimeters of bedding using oatmeal and a small slice of potato or carrot for moisture. Place a lid with air holes over each aquarium. Observe the mealworm in its habitat on a daily basis, making journal entries weekly. Document each stage of the mealworm's metamorphosis. Sort and count all living larvae, pupae and adult beetles as well as any dead ones found. Create a table or graph. Repeat the above steps for six to eight weeks.

Conclusion: The data suggests that the chemicals in the Air Wick air freshener appeared to have had an adverse effect on the life of the mealworms.

PROJ# J 19

NAME: Chase Owczarzak **GRADE:** 6

GENDER: Male

SCHOOL: Hal E Clark Middle School

PROJECT TITLE: Stick to It

ABSTRACT:

The purpose of doing this experiment is to find out which household glue adheres the fastest. I will conduct an experiment by applying various glues to two wooden popsicle sticks. Each set of popsicle sticks will overlap one centimeter end to end. Second, I will lift one end of the popsicle stick at each one minute interval. If the two wooden sticks fall apart, I will stick them back together at the one centimeter mark and continue to test at each minute. If the two sticks adhere within this first minute then I know that the glue adheres within a minute and I can continue to test the other glue types. Lastly, I will record the data I found. I predicted that the wood glue would adhere the fastest since I was using wooden popsicle sticks. Upon testing three trials at one minute intervals, I found out that most of the glues adhered within that minute, so I needed to change my interval time. I continued with the same procedure only now checking each glue at ten second intervals. I found out that the wood glue wasn't the fastest and hot glue actually adhered the fastest. The hot glue adhered within ten seconds consistently in all three trials. But, wood glue came in a close second. Wood glue adhered within ten seconds in two trials and then the last trial it adhered in twenty seconds. I also found out that a glue stick was the most unreliable glue I tested because the results varied greatly.

PROJ# J 20

NAME: Neha Ramani **GRADE:** 8

GENDER: Female

SCHOOL: West Lafayette Jr/Sr High School

PROJECT TITLE: Can Nano-Probes Target and Attack Cancerous KB Cells (Using Doxorubicin)?

ABSTRACT:

Currently, there are many different cancer treatments in use, such as chemo and radiation therapy. The problem with these is that although they sometimes do their intended job of killing off, or stopping the multiplying of cancer cells, they more often than not damage other good cells. After researching different cancer treatments and cancer itself, I realized that there are other ways of attacking those stubborn tumors. There is a drug used in chemotherapy called Doxorubicin. The exact mechanism of action of Doxorubicin is complex and still somewhat unclear, though it is thought to interact with DNA by intercalation. Basically, it stops cells from multiplying, which is what we want for treating cancer. I decided to see if there was a way of getting the Doxorubicin directly to only the cancer cell instead of generally in that area, to prevent the damage of other cells. I did this by putting the Doxorubicin in gold nano-rod probes, and used KB cancerous cells. One difference between KB cancer cells and normal cells is that the cancer cells have folate receptors. This means that they can receive the Doxorubicin, and the cancer cell will stop multiplying and will eventually commit apoptosis, which is cells committing suicide. My actual experiment to see if the gold nano-rod would be able to target the cancerous cell lasted about 24 hours. First, I helped some trained professionals prepare the cell cultures and let them settle. Then, the first probes were attached. It took about a half hour for there to be any change in the cell, which I was monitoring during that time. My hypothesis proved to be correct, since the gold nano-rod with the Doxorubicin did indeed latch on to the folate receptors in the KB cells. I know this because Doxorubicin has fluorescent properties, so when a picture was taken with the microscope, the areas of the cell where the Doxorubicin had reached were clearly marked. I had several pictures taken over a 24 hour period, so as time went on, it was interesting to cell what was happening to the cell. My project shows that the hope for a relatively safe cancer treatment is not over. Since my project tested only a small amount of cells, it cannot be said that this treatment will work 100% of the time. Still, if scientists researched more in this area and performed my experiment on higher scales, millions of lives could potentially be saved.

PROJ# J 21

NAME: Alex Barksdale

Shan Patel

GRADE: 8

GENDER: Male

SCHOOL: Honey Creek Middle School

PROJECT TITLE: Are dandelion and other natural herbs as effective as commonly prescribed antibiotics?

ABSTRACT:

In our project we tested dandelion along with different herbs. We wanted to test these herbs against the inhibition of common gram negative and gram positive bacteria against Ampicillin for antibacterial properties. We inoculated several agar plates with three bacteria, made holes in the agar and used 75 milliliter of each substance to test for an we measured the antibacterial properties. We then incubated the cultures overnight at a constant 37 degrees Celsius. The next day we measured the diameter of the zone of inhibition. Although we expected at least some resistance to the bacteria, our results were surprising. Dandelion didn't show any properties of being antibacterial at all, as well as another substance, cedar wood oil. Ampicillin was able to inhibit growth with Staphylococcus Aureus and Escheria coli while no signs of inhibition were detected on pseudomonas aeruginosa. Eucalyptus oil was also able to resist with Staphylococcus Aureus and Escheria coli, as well as nutmeg oil, but each with less effectiveness than ampicillin. Even though they do have antibacterial properties, dandelion, and other natural herbs were proven not to be as effective as antibiotics.

PROJ# J 22

NAME: David Ryker **GRADE:** 7

GENDER: Male

SCHOOL: Canterbury School

PROJECT TITLE: Can CO2 Magnify Sound?

ABSTRACT:

Based upon my research I formed a hypothesis that CO2 placed inside a balloon will magnify sound. Like light passing through glass, sound passes more slowly through CO2 than through air, and will refract. A balloon holds the gas inside in a curved shape, similar to a magnifying glass. Therefore a balloon filled with CO2 should act like a sound lens and magnify sound.

Data will be collected using a sound level meter. Two balloons will be used, one filled with air and another filled with CO2. A fan will be used to produce a constant sound. Measurements will be taken with the balloons at zero feet from the sound level meter, one foot away, two feet away, and three feet away. The closer the CO2 balloon was to the sound level meter the more the volume increased. The data collected from the experiment was as follows for the CO2 balloon: 60 dB at three feet, 61 dB at two feet, 62 dB at one foot, and 65 dB at zero feet. The balloon with air in it measured 60 dB at all distances, the same as the ambient sound level.

My hypothesis was supported by the data. Carbon dioxide placed inside a balloon will magnify sound. The reason is that the CO2 slows and refracts the sound waves, and the balloon is holding the gas in a curved shape similar to a magnifying glass, thus redirecting and magnifying the sound waves. There were no significant errors in this experiment.

PROJ# J 23

NAME: Forest Smock **GRADE:** 8

GENDER: M

SCHOOL: Our Lady of Perpetual Help

PROJECT TITLE: Contamination: The impact of a rain event on surface water.

ABSTRACT:

The purpose of this project was to look for and quantify the presence of life-threatening biological contaminants in the waters in which I play in the summertime. I hypothesized that the amount of fecal and non-fecal coliforms in surface waters would increase after a rain event of one or more centimeters. The procedure I used to test my hypothesis entailed taking samples from four different bodies of water on five different occasions. I took samples before and after the rains. There was an observable increase in the quantity of fecal and non-fecal coliforms after rain events. My hypothesis was supported.

PROJ# J 24

NAME: Gage Sorrell **GRADE:** 5

GENDER: Male

SCHOOL: North View Elementary

PROJECT TITLE: Do stronger magnets produce more energy in a generator?

ABSTRACT:

A generator works because of the Law of Induction, the reaction between a magnet being moved over a coil and the coil conducting electricity. I designed and built a generator and test magnets of varying strength to answer my question.

PROJ# J 25

NAME: Emma Sperry **GRADE:** 8

GENDER: Female

SCHOOL: Honey Creek Middle School

PROJECT TITLE: Is it Alive? Children's Understanding of Living Things

ABSTRACT:

I was interested in 1st, 3rd, and 5th graders' understanding of the different words and properties that apply to living things. I thought that boys and girls would not differ, but I expected 5th graders to have a better understanding of living thing concepts than 3rd graders, who would have a better understanding than 1st graders.

I created 17 cards. Each card contained a photograph of one of four types of items: animals (such as a bear), plants (such as dandelions), natural objects (such as the sun), or manmade objects (such as scissors). I individually tested 106 students from 1st, 3rd, and 5th grades. Each student responded to five different questions, randomly presented, on all 17 items. I sorted student responses by grade, gender, number of correct responses to each question, and pattern: pattern 1-students answered yes to animal cards only, pattern 2-yes to both animal and plant cards, pattern 3-yes to animal, plant, and natural object cards, and pattern 4-no pattern. □□□□□□
No consistent significant pattern of gender differences was shown. As a result, boys and girls were combined for grade-level tests.
□
ANOVA tests showed significant differences between grades in total correct responses for every question except "Did another [name of item] help make this." Chi-square tests were performed on the patterns, but the distributions did not vary significantly based on grade.
□
I concluded that significant growth is occurring in elementary school children's knowledge of living things. All the same, however, some children at every grade level did not seem to have a stable concept of living things.

PROJ# J 26

NAME: Krithika Subramaniam **GRADE:** 8

GENDER: Female

SCHOOL: West Lafayette Jr/Sr High School

PROJECT TITLE: Moisture Uptake in Fabrics

ABSTRACT:

The purpose of this experiment is to determine which fabric absorbs moisture the fastest and also the most amount. The experiment consists of testing strips of fabrics made from cotton, nylon, wool, polyester and silk. Each fabric is cut into strips of a similar size. One of the edges of each fabric is dipped into a small amount of water in a container. Also a ruler is kept vertically beside the container to measure the distance the water travels up the fabric. The timer is started once the fabric is dipped into the water and at periodic intervals the distance traveled by the moisture along the fabric is recorded. The results are plotted graphically as a function of time. The slopes of the lines indicate how quickly the moisture is absorbed by a particular fabric.

PROJ# J 27

NAME: Jonathan Sutterer **GRADE:** 5

GENDER: Male

SCHOOL: Saint Patrick School

PROJECT TITLE: Does Water Affect the Strength of Concrete?

ABSTRACT:

Concrete is one of the most often used building materials in the world and it is fire resistant. It can be used for building structures and to finish things. The ingredients used to make concrete are cement, water, coarse aggregate, and fine aggregate. It is important to mix the ingredients correctly because it determines the strength for the job it's needed for. For this experiment, concrete was mixed with three different amounts of water and its strength was tested after 14 days. It was found that too much or too little water makes the concrete weaker. The right amount of water is needed to get the job done.

PROJ# J 28

NAME: Phillip Witcher **GRADE:** 8

GENDER: male

SCHOOL: Hamilton Southeaster Junior High

PROJECT TITLE: Spoiled Soil

ABSTRACT:

On December 22, 2008, a massive coal sludge spill occurred in Harriman, Tennessee. This man-made disaster inspired me to test the effects of coal ashes on bean plants. My hypothesis was that the bean seeds planted in the soil without any coal ashes will have the fastest germination time and growth rate. To conduct the experiment, specific amounts of coal ashes were added to topsoil in order to create a mixture. The bean seeds were planted in the different soil mixtures (i.e. different trials). As a result, the bean plants which were planted in soil without any coal ashes had the fastest growth rate. Also, every bean seed, with two exceptions, germinated on the same day. In conclusion, the results of this experiment showed that when bean seeds were planted in soil with a significant amount of coal ashes in it, the bean plants had a minimal chance of survival. This represents just how detrimental a disaster like this can be on agriculture and the environment.

PROJ# J 29

NAME: John Beutner **GRADE:** 8

GENDER: Male

SCHOOL: Saint Paul Lutheran School

PROJECT TITLE: Solar experiments using a Fresnel lens

ABSTRACT:

The purpose of my experiment is to use a Fresnel Lens in diferent applications of solar collection in a high output multifunction solar collectior. My experiment will include experiments with heating domestic hot water,, enhancing the output of photovoltaic solar cells, heating air with a solar collector and cooking with a solar collector. My steps to conduct these experiments are as follows: Using the Fresnel Lens from a discarded TV I will use discarded, recycled and surplus materials to build a solar collection box. The 1st experiment will involve a practical system for production of domestic hot water. I will use discarded flexible gas lines, a metal plate and a small pump to circulate water in my solar panel. In the 2nd experiment I will place photovoltaic cells in the Fresnel Lens box and compare the output to cells outside the box. The 3rd experiment is to use a small fan from an old computer to produce warm air to heat a building. The 4th experiment is to try to cook with the Fresnel Lens. I found the Fresnel Lens to be very effective and was able to produce 2,260 BTUs/hr. as a water collector, 1860 BTUs per/hr. of hot air. I was able to increase the output of photovoltaic cells by more than 50% and I was able to cook foods and boil water.

PROJ# J 30

NAME: Jacob Burris **GRADE:** 7

GENDER: Male

SCHOOL: DeKalb Middle School

PROJECT TITLE: Between the Walls II

ABSTRACT:

The purpose of my project was to determine with a given variety of materials, which type of insulation will keep two ice cubes cold the longest? For my hypothesis, I felt that out of the materials I will test, the sawdust will do the best at keeping two ice cubes cold. The procedure consisted of taking a cup containing two ice cubes and placing them in a box. Insulation will be placed around the cup (completely encasing it). The temperature of the ice will be taken using a thermometer at the beginning of the test and at the end of (30) minutes. The test will be repeated using a 30 minute time frame. All tests will be run at least two times. The types of materials to be tested are: blown-in insulation (cellulose), fiberglass batts, rigid board (foam), styrofoam, bath towels, and sawdust. By graphing the recorded temperatures, type of materials and time span, I can determine which of the tested materials is the better insulator. Additional tests may be performed based on preliminary findings. The results from my testing disproved my hypothesis – saw dust was not the best at keeping the ice cubes cold. In conclusion I found the material that performed best at holding in the heat was the blown in insulation (cellulose).

PROJ# J 31

NAME: Zachary Jones **GRADE:** 8

GENDER: Male

SCHOOL: Lakewood Park Christian

PROJECT TITLE: Surface Texture vs. Wind Resistance

ABSTRACT:

My science project is to see if surface textures can affect air resistance. The idea for this experiment came from an episode about sharks on the Discovery Channel. Sharks swim efficiently in the water as well as other sea dwellers. Shark scales had a texture that looked like triangular grooves and I used this idea to test it in air. I made five identical rockets each with its own texture. The textures were triangular grooves, flat, gloss, sandy, and bumpy. For the drag test I used a furnace blower to generate wind. A scale was used to weigh the drag. I first calibrated it to zero with the rocket in place. I turned on the blower and recorded the amount of drag that was produced. The most efficient design was the triangular grooved rocket with 2.5 g of drag. The gloss and flat designs came in second with 4g of drag. Next was the sandy with 5g of drag and last was bumpy with 9 g of drag. Seeing that surface textures can affect air resistance, it could be possible to add textures to vehicles such as automobiles and airplanes to increase gas mileage. Perhaps the same idea can be applied to rockets, boats, race cars, and other vehicles to improve mileage.

PROJ# J 32

NAME: Jordan Cadle **GRADE:** 7

GENDER: M

SCHOOL: Paoli Jr High School

PROJECT TITLE: Evaluation of Soil textures on Economic Performance of Yellow Dent Corn Under Adverse Moisture Conditions

ABSTRACT:

Not Yet Submitted

PROJ# J 33

NAME: Lucas Tang **GRADE:** 8

GENDER: Male

SCHOOL: Nativity of Our Savior School

PROJECT TITLE: School Lunches: Too Much Fat And Cholestrol?

ABSTRACT:

This project's purpose is to see if Nativity School lunches contain too much fat and cholesterol. For my procedure, I received my lunch provided by Nativity School. After I received my lunch, I asked the server which foods were baked or fried. I recorded this. Next, I weighed my food in grams. I repeated this process for each of the five days of the school week. I also researched the Portage School system's lunch menu through the internet. I chose foods from the virtual menu according to my tastes. Serving sizes were based on the recommended serving. Then, I went to www.thecaloriecounter.com. This site provides nutritional label for each of the food choices. Therefore, I recorded the amount of cholesterol and fat, along with the percentage of daily value of each food that I chose. In addition, I also count the calories. All of this data was compared.

For my results, I found out that Nativity's provided lunches for that particular week were much higher in fat and cholesterol content than the recommended amount. Compared to Portage's fat and cholesterol levels, Nativity's are much higher.

For my conclusion, I noticed that the Portage School Systems only offer dessert once a week, while Nativity offers dessert daily. Also fat and cholesterol levels were somewhat high in the dessert. Therefore, to lower the amount of fat and cholesterol in their lunches, Nativity should consider offering dessert only once a week like the Portage School Systems.

PROJ# J 34

NAME: Luke Wechter **GRADE:** 6

GENDER: Male

SCHOOL: West Noble Middle School

PROJECT TITLE: Waste to Garden - Garden to Waist

ABSTRACT:

The purpose of this experiment is to determine which organic animal waste fertilizer combined with soil is best for growing corn and radishes. Clean animal waste was collected from beef, swine, duck, horse, and sheep. The waste was combined with soil and placed into containers for each species. The control contained only soil. Corn and radish seeds were planted. Observations and measurements of growth were recorded. The results of this experiment were that the duck organic fertilizer resulted in the most growing radish plants. The least amount of radish plants resulted from the sheep organic fertilizer. The corn grew best with the duck organic fertilizer, horse organic fertilizer and the control. The least effective for the corn was the beef organic fertilizer. The control plants germinated and grew well, but as time elapsed they became thin and started to fall over. Results of the manure analysis and the experiment were compared and charted. The minerals already in the soil were good but not enough to keep the plants healthy. The results support the hypothesis of the duck organic waste being the best fertilizer. However, the part of the hypothesis that the sheep organic waste would be the least effective should be rejected.

PROJ# J 35

NAME: Annie Beisecker **GRADE:** 7

GENDER: F

SCHOOL: Lighthouse Christian Academy

PROJECT TITLE: Insulators

ABSTRACT:

My question was: which insulator will work the best to keep water the coldest after three hours. I hypothesized that the packing peanuts would stay at the coldest temperature because of various reasons from the background information that I have recently collected. Over all, my data was going up at a steady rate over the intervals of ten minutes. For my experiment I took five insulators: wool yarn, sand, batting material, packing peanuts, and paper, and I tested them to see which of these five insulators would work the best to keep the water colder longer. I also had one control with nothing in it to see if the insulation even worked at all. I used a thermometer to record the starting temperature and then I recorded the temperature every ten minutes for three hours. Then I put all of the data that I collected into a bar graph to show how different the insulators were and how steady that they went up. In the end, the control (the experiment with no insulation) was the warmest of all the insulators that I collected. The one that stayed the coldest over three hours was the batting material from an old cotton pillow.

PROJ# J 36

NAME: Colten Black **GRADE:** 7

GENDER: M

SCHOOL: Greensburg Jr. High School

PROJECT TITLE: Solar Power Renewable Energy

ABSTRACT:

My project started with my frustration with the high gas prices and the impact fossil fuel has on the environment. With green house gases and a hole in the ozone we need to be looking at different forms of transportation, and alternative energy for us to use. I was looking at my dads Mother Earth News Magazine and found an article on solar power and how it could really help the environment. So I started thinking why couldn't we do this to a car? Later that day I asked my dad what he thought about it. He said we need to take action now not just for the current time but the future depended on it. Around this time gas went to over $5.00 per gallon and I just couldn't understand why. I then found an old remote controlled jeep I had and some old solar power lawn and garden lights as well as a couple of solar power flashlights we had just laying around. I first wired everything together and took the batteries out of the jeep to see if it would just run on the panels but it didn't. I also after research found that the panels had to be wired in a series. That was my next step so I wired them in a series mounted a battery pact to the jeep and tried it out. My results were not as good as I thought after I tried it out the next day it would not run and I couldn't figure out why. Off to the internet I went and found out that I needed a "Blocking" diode in order to keep the batteries from loosing there power at night back through the solar panels. Then I went to Radio shack and got a diode and wired everything together. Now the Jeep runs great not only does it demonstrate renewable energy but it also cuts down on me having to buy batteries all the time. The solar panels charge the rechargeable batteries and it runs for a longer amount of time especially during the day time. This project taught me a lot and I think it would be possible to make a real car this way.

PROJ# J 37

NAME: Madelyn Hunger **GRADE:** 7

GENDER: F

SCHOOL: Greensburg Jr. High School

PROJECT TITLE: How Low Will it Go!

ABSTRACT:

My question was does daily exercise help lower the morning blood glucose levels in type 1 diabetics? My hypothesis is that daily exercise will help lower the morning blood glucose level in type 1 disbetics. My independent variable is the physical exercise I did. My dependent variable is the lower morning blood glucose levels. My results were that daily exercise does lower the morning blood glucose levels dramatically. During the first 28-day period, the percentage of morning blood glucose levels in the targeted range was 14%. During the 28-day period with 30 minutes of exercise, the percentage of morning blood glucose levels in the targeted range was 42%. My conclusion is that my hypothesis was correct. I learned that a little exercise every night or day will help lower the morning blood glucose levels in type 1 diabetics. I also learned that exercise helped my morning blood glucose levels dramatically.

PROJ# J 38

NAME: John Ray II **GRADE:** 8

GENDER: M

SCHOOL: Lighthouse Christian Academy

PROJECT TITLE: Running

ABSTRACT:

QUESTION: Can a meal eaten before a run alter the performance of conditioned runners during the run? SUMMARY: Runners are fed the same meal, 30-60 minutes before a mile run. The same runners perform the same run without eating in the 60 minutes leading up to the run. HYPOTHESIS: Runners will perform better if not eating a standard, filling meal in the hour preceding the run. CONCLUSION: The hypothesis is confirmed: runners perform best when not eating to the point of being "full." Other lines of inquiry were briefly investigated, opeining the door to more conclusive studies in the future.

PROJ# J 39

NAME: Eva Shelton **GRADE:** 8

GENDER: F

SCHOOL: Greensburg Jr. High School

PROJECT TITLE: Ah-Choo! Baking Powder Time!

ABSTRACT:

My Science Fair project is titled: Ah-Choo!Baking Powder Time! My question is, "Does baking powder affect how high and soft muffins turn out to be?" My hypothesis is that baking powder does have the effect of making muffins softer and higher after it's been baked. My control was the muffins baked according to a normal recipe of 4 tsp. of baking powder. The independent variable was the amount of baking powder put into different kinds of muffins. The dependent variable was the difference in height and texture of the muffins. I mixed the ingredients together, and put the batter without baking powder into one section of the pan. Then, I added 2 teaspoons of baking powder into the batter, and put the batter into another section of the pan. After that, I mixed 2 more tsp. of baking powder into the batter, and I placed the batter into the pan. The muffins were baked at 425 degrees for 15 min. I let them cool down for 20 min. Next, I measured and averaged the height of each muffin. Then, I compared texture. I recorded the results. I conducted the experiment three times. My results were that muffins become higher and softer as the amount of baking powder increased. My conclusion is that my hypothesis is proved correct.

PROJ# J 40

NAME: Sarah Bellavance **GRADE:** 8

GENDER: Female

SCHOOL: Canterbury School

PROJECT TITLE: What's in Your Lunch?

ABSTRACT:

This experiment was conducted to discover which lunch better met one third of the Recommended Daily Allowance: Canterbury's hot lunch or students who packed their lunch? The components that were tested were calories, grams of fat, grams of protein, milligrams of iron, and milligrams of calcium.

Canterbury's hot lunch was recorded for thirty days. All five components were recorded for every food item. Then a maximum of twenty people per day for ten days were interviewed if they had a packed lunch. They were asked what they packed and how much of each food item they packed. Each component was researched and recorded for each food item, then added up for each lunch. An average was taken for the cafeteria lunches as well as the packed lunches. The averages were also compared to one third of the RDA.

There was lots of data that was recorded. Each individual food item had a separate count of calories, grams of fat, grams of protein, milligrams of iron, and milligrams of calcium. Each food item was totaled to equal a lunch. Then all the lunches were averaged. This took a fair amount of time.

When looking at the packed lunches' averages, they were below the RDA in every category. But the hot lunch's averages were below and above the RDA in different categories. Therefore, a clearly defined winner or loser was not present in this experiment.

PROJ# J 41

NAME: Sergio-Steven Cobos **GRADE:** 6

GENDER: Male

SCHOOL: St. Jude Catholic School

PROJECT TITLE: Can We Use Weeds for Biofuel?

ABSTRACT:

The purpose of my project was to extract oil from non-food sources, like dandelion weeds and fallen tree leaves, so that it can be turned into a biofuel because I wanted to see if there was something that could give us fuel that's good for the earth and not make people go hungry. Corn may not be the best source for biofuel because using it makes food prices go up, people go hungry and global warming worse. We're cutting down the rainforest and clearing vegetation and more farmers are growing corn instead of other crops. Using weeds and fallen leaves for fuel would be more environmentally friendly than using corn or fossil fuels because they won't add more CO2 into the environment, they grow in waste land, they're a renewable resource and they won't take food away from people. My question was can a fuel be produced from non-food crops such as weeds and yard waste that is an environmentally friendly alternative to food based fuels and fossil fuel? To find my answer I gathered fallen oak tree leaves and dandelion weeds and I distilled them. My results supported my hypothesis and showed oil could be extracted from these non-food items and that this oil could burn. My results are important because they show that we may be able to produce an environmentally friendly fuel from non-food crops and this means we won't have to hurt our environment or make people go hungry to get our energy needs.

PROJ# J 42

NAME: Annemarie Carney **GRADE:** 8

GENDER: F

SCHOOL: Our Lady of Perpetual Help

PROJECT TITLE: The Streamline Effect.

ABSTRACT:

The purpose of this experiment was to find out if a sloop with a fin keel and soft chines or a sloop with a keel and soft chines will be less resistant in water. The other purpose of this experiment was to find out what effect buoyancy has on the boats resistance in the water. I had three hypotheses. The first one was that a boat will float higher in fresh water than the same boat in salt water. The second was that the hull shape and the speed of the object will have an effect on the amount of friction produced. My third hypothesis was that the boat that was the sloop with a keel and the soft chines will have the least resistance in the water. To test my hypothesis I built the two boats and a proportionate lake. The "lake" had a spring scale and a water pump. Both boats were connected to the spring scale in the flowing water for ten trials in newtons and then how deep they sat in the water was measured in centimeters. I then made the water into salt water and connected the boats to the spring scale to repeat my previous steps. My first and third hypotheses were not supported. The boats sat higher in the salt water than in the fresh water. The sloop with the fin keel and the soft chines actually had the least resistance. However, the resistance of the boats did increase as the speed of the water increased.

PROJ# J 43

NAME: Bowman Clark **GRADE:** 7

GENDER: M

SCHOOL: Castle Junior High School

PROJECT TITLE: Betta's Bite

ABSTRACT:

The purpose of this project was to find which of five fish: a Platy, Gourami, female Betta, male Betta, or a Goldfish, will a male Betta be most aggressive in tail slaps and broadside displays against. The hypothesis is that the male Betta will be most aggressive in tail slaps and broadside displays against the other male Betta. The materials used for this project are a ten-gallon tank, a divider for the tank, NovAqua water conditioning, a Gourami, two male Bettas, a female Betta, a Goldfish, a Platy, an aerator, a filter, a fish net, and a timer. To do this experiment, first set up a fish tank, and divide into a three-gallon side and a seven-gallon side. Put the test male Betta in the three-gallon side and the rest of the fish in the other side. Set the timer for two minutes and place the first fish you wish to test in the three-gallon side. Start the timer and count the number of broadside displays and tail slaps that the test male Betta performs. Repeat this at least five times. Record the data. Repeat those steps for each other fish. The data showed that the test male Betta was most aggressive against the other male Betta, followed by the Gourami, then Female Betta, Platy, and finally the Goldfish. This will help aquarium hobbyists to know if they can keep Bettas with other fish.

PROJ# J 44

NAME: Adam Harris **GRADE:** 7

GENDER: M

SCHOOL: Castle Junior High School

PROJECT TITLE: Which Recycled Paper is Most Durable?

ABSTRACT:

The hypothesis is that recycled construction paper will withhold the most weight from the bouncy ball.

I tested my hypothesis by dropping a ball on each piece of paper (that I made) numerous times. The materials used are cordless drill, one and one half inch screws, two foot long 2 inch wide PVC pipe, small bouncy ball, blender, paper shredder, two inch drill bit, and one sixteenth inch drill bit. I also used 2 C clamps, black aluminum screen. To make the paper I needed 10 pieces of lined, newspaper, magazine, and construction paper. I needed 5 pieces of computer paper. Last but not least a manual miter box, manual saw, 20' of 1'' by 4'' wood, 16' of 1'' by 2'' wood, Tape measure, Wood chisel, and Sandpaper. The independent variable is the type of paper. The dependent variable is the number of times it takes for the ball to go through the paper. The control is the regular piece of computer paper. For the procedure you have to make the paper screen, the ball drop frame, and the paper holder. Next I had to make my paper. For the testing process use the c clamps and the scrap wood, insert a piece of your homemade lined paper. Drop the bouncy ball through the tube of the ball drop how ever many times it takes for it to go all the way through the paper. Record this in your notes. Then do steps 2 and 3 with your four other pieces of lined paper. After that do steps 2-4 with magazine paper, newspaper, construction paper, and your control (two pieces of back to back computer paper).
The testing process ended with computer paper being able to with hold the most weight with 59.6 times it took for the ball to go through on average. And not far behind was recycled construction paper with 21 times on average. Following those are lined paper and construction paper with 8.2 and 4 on average. The weakest paper on average was magazine paper with 2 times.

After experimentation I concluded that the regular computer paper control is stronger than recycled construction paper (hypothesis), magazine paper, newspaper, lined paper. The construction paper is second strongest.

Environmentalists would benefit from this information because they can separate paper into groups. Then they recycle and sell it in higher or lower grades.

PROJ# J 45

NAME: Colin Olson **GRADE:** 6

GENDER: M

SCHOOL: Castle Junior High School

PROJECT TITLE: Watery Descent

ABSTRACT:

This experiment was conducted to determine which of the selected shapes: square, triangle, rectangle, or cylinder will have the fastest descent time in water. The hypothesis states that the cylinder will descend the fastest. This was tested by dropping each model through 1.524 meters of water in a vertical testing chamber.

In this experiment, the independent variable was the shape of the model being tested and the dependant variable was the amount of time it took for the model to travel the test distance. Relating to the force diagram, the net force equals the sum of all the other forces acting upon the models. The buoyant force (Archimedes' Principle acts upward combined with the drag force, which acts against the direction of movement of the model. Each model was designed to be negatively buoyant resulting in a net force downward. Factors that were held constant during this experiment were the water temperature, level, and source. The volumes, cross- sectional areas and the weight of the models were also designed to be identical.

On average, the cylinder had the fastest descent of 2.94 seconds, followed by the square (3.05), rectangle (3.34), and triangle (4.15). Since the cylinder had the lowest mean descent time, the hypothesis is supported. The calculated drag coefficients also support the hypothesis. The outcome of this experiment could help divers, sonar, submarine, and torpedo designers to optimize the shape of their products or themselves and reach greater descent speeds underwater.

PROJ# J 46

NAME: Ryan Chung **GRADE:** 7

GENDER: Male

SCHOOL: Honey Creek Middle School

PROJECT TITLE: The Effectiveness and Environmental Impact of Salt on Roads

ABSTRACT:

This project studies effectiveness of deicers on roads and environmental impact. The calcium chloride, is not only is the most effective deicer, but at 1.5M with beet juice is the most environmentally friendly.

Solutions of 0.25%-5M salt were used to determine the freezing point at various temperatures. At an average temperature of -22 C after 24 hours, 250mL of calcium chloride froze at molarities of 0.3 and 0.6 yet the potassium chloride, sodium chloride and magnesium chloride froze at 0.3, 0.6 and 1.25.

The salt solutions were also used to study the effects on sweet corn and rye grass. The 0.3M, 0.6M and with beet or tomato juice was the same as the control. There is a trend of shorter height with higher salt concentrations.

The most effective deicer is calcium chloride with beet juice. This solution has the least environmental impact on grass growth. Of the best deicers, the 1.25M calcium chloride in beet juice has least environmental impact. The SAP with 5M CaCl2/Beet juice is good at slowly melting the ice at lower temperatures.

PROJ# J 47

NAME: Nicole Curtis-Davis **GRADE:** 8

GENDER: Female

SCHOOL: East Washington Middle School

PROJECT TITLE: How Caffeine from Coffee Grounds Affects the Growth of Plants

ABSTRACT:

Many people put coffee grounds in their soil to make their plants grow better. But how do the coffee grounds affect plant growth and why? This project was designed to try and answer these questions. The purpose of this project was to determine how caffeine from coffee grounds would affect the growth of tomato plants. It was hypothesized if tomato plants were watered with coffee ground soaked water, they would grow better than those watered with plain tap water. Ninety-four, Jubilee tomato seeds were planted and allowed to germinate in regular potting soil. A plant starter tray was used and the plants were allowed to germinate and grow in the greenhouse at Eastern High School. They were allowed to grow until their first set of true leaves appeared. The starter tray was divided in half, with one half of the plants as the control and the other half of the plants receiving the coffee ground water. Each plant in the control group received 10 mL of plain tap water and each plant in the experimental group also received 10 mL of water where coffee grounds had been soaked. Plants were watered every other day. The growth of the plants was recorded and the condition of the plants was observed. The average total growth for the plants in plain tap water was 5.33 cm and the average total growth for the plants grown in the coffee ground soaked water was 5.21 cm. Student's t-Test was used to compare the results and found to not be significant (p=.639848). Based on the data collected, the hypothesis was not supported.

PROJ# J 48

NAME: Raina DeVries **GRADE:** 5

GENDER: Female

SCHOOL: Prairie Vista

PROJECT TITLE: Ethanol From Corn Stover: A Way To Solve Our Energy Needs!

ABSTRACT:

Purpose: I wanted to find out which pretreatment of corn stover would break up the cell wall the best and produce the most glucose.

Procedures: I needed a glucose meter, Avicel, cellulase, corn stover, 5% sulfuric acid, KOH, a pressure cooker, and pipettes. I first calibrated the glucose meter with standard solutions. I next determined the minimum amount of time required for the cellulase reaction. For the actual experiment, I cut corn stover into 1/4 inch diameter pieces and put 3-4 pieces in each test tube. I gave half of the tubes one ml of acid and the other half one ml of water. I put the tubes in one of three conditions: a pressure cooker at 125oC, a boiling water bath at 100oC, and a shaker at room temperature. I stopped the reaction after 1 hour. I neutralized the acidic tubes with KOH. I then added cellulase and reaction buffer to each tube and left them in a water bath at 40oC for 18-24 hours. I then measured the glucose concentration in each tube.

Results: The condition with 5% sulfuric acid in a pressure cooker produced the most glucose.

Conclusion: The pretreatment Pressure Cooker-Acid produced the most glucose. Acid was better than water in each condition, except at room temperature. Glucose can be used to produce ethanol, which is an environmentally friendly liquid that can reduce our need to use fossil fuels like oil.

S

PROJ# S 1

NAME: Shaneca Carter **GRADE:** 12

GENDER: Female

SCHOOL: Campagna Academy Charter School

PROJECT TITLE: Flame Retartant Paint

ABSTRACT:

How many more kids must we let burn in house fires. In the year 2007 there were 6,620 fires, 47 deaths, 194 injures, and 72,897,323 total dollars in property and content in Indiana. Sodium bicarbonate or sodium hydrogen carbonate is the chemical compound with the formula NaHCO3. Sodium bicarbonate is a white solid that is crystalline but often appears as a fine powder. The reason I think sodium bicarbonate might to work to inhibit burning is because when sodium bicarbonate is heated it produces CO2. The purpose of my project to see if I can make paint that is less flammable. I first put 20 milliliters of latex paint into each of 12 cups then I mixed in the sodium bicarbonate in 0.1g increments from 0-1.0 grams. I cut out 10 strips, 3 cm x 25 cm from batter paper for each sample and painted each of them. After the paint was dried, I suspended the strips over a container of water. I lit the bottom of the strip and recorded the time required for the strip to burn. I repeated the experiment using 20 ml of paint (Latex or oil base) in each of 12 cups and adding 0-22 grams of sodium bicarbonate in 1 gram increments. Sheets of paper 25 cm x 40 cm were used and I poured paint onto the sheet, spreading it to cover the sheet evenly. After the paint dried I cut the paper into 3 cm x 25 cm strips. The strips were hung above a pan of water and I lit the strip. I determined the time required burning the strip or the amount of time the strip burned. In conclusion latex paint burns slower than oil base paint. The more sodium bicarbonate that is added to the paint, the slower it burns. My paint might prevent loss of life and property by providing more time for occupants to escape and more opportunity to quench the fire before it becomes too wide spread.

PROJ# S 2

NAME: Michael Glover **GRADE:** 12

GENDER: Male

SCHOOL: Jefferson High School

PROJECT TITLE: And Then There Was Light: A Study of the Electromagnetic Force Carrier

ABSTRACT:

The purpose of this project is to statistically analyze relativistic physics versus Newtonian physics. Ws Einstein right or was he just making good guesses? Is a Newtonian equation as good as a relativistic equation in calculating the physics involved with high energy particles? The procedure is simple. Using the Compton Scattering experiment we collect the scattered gamma rays from Cs123 over several different scattering angles. This is the hard data and will be used as the reference point for the two equations. The next step is to find a relativistic equation. In this case it is provided by Compton's scattering theory. Next find a Newtonian equation equivalent to the relativistic equation. I then graphed the equations and the data collected on one graph and did a chi squared distribution test between the data and each of the equations. The percentage given by the chi squared calculation should show how well the data fits that particular equation. The one with the highest percentage would fit the best. Of the two graphs, the relativistic equation fits the best after calculating chi squared. If the mean slope is calculated, the Newtonian equation seems to fit best.

PROJ# S 3

NAME: Sean Hendricks **GRADE:** 12

GENDER: Male

SCHOOL: Marian High School

PROJECT TITLE: Altering Sequence-Specific Motions Guiding Protein-Protein Interactions - Phase II

ABSTRACT:

Protein-protein interactions are often facilitated by small docking domains. These domains frequently have flexible docking loops that recognize and bind the target proteins. Examples are WW domains, a family of docking domains recruited by numerous signaling proteins. The binding specificity of WW domains have been linked to the amino acid sequences of their docking loops. Understanding just how these sequences encode binding specificity is essential for understanding the molecular basis of cell signaling. Sequence-specific dynamics of docking loops in Pin1 have been found to affect binding specificity. Pin1 regulates cell growth and understanding how its WW domain recognizes other proteins can boost our molecular understanding of cancer.
This project asks: “How does loop mobility change upon mutation of loop amino acid sequence?” To answer this question, a loop mutant for the Pin1 WW domain was generated, and the consequences were observed by Nuclear Magnetic Resonance (NMR) spectroscopy. The mutation was a single-site depletion. It was hypothesized this mutation would alter the domain of the wild type. The NMR results did show a change in the loop hydrogen bond network. The result indicates potential hydrogen networks within the loop. This in turn sheds new light on how loop sequence encodes the inter-residue contacts influencing loop mobility and substrate binding.

PROJ# S 4

NAME: Adam Hibshman **GRADE:** 11

GENDER: Male

SCHOOL: Elkhart Memorial High School

PROJECT TITLE: Corked vs. Uncorked: The Effects of Corking a Baseball Bat

ABSTRACT:

What causes baseball players to continue to cheat using corked bats? If I cork a bat and hit a ball ten times, then hit a ball ten times with an uncorked bat, the average distance traveled by the ball struck by the corked bat will be greater. There have been other experiments done to research this interesting concept. The others that I researched came to the same conclusion that this experiment did. . A corked bat isn't going to make some one hit a ball 600 feet or any further than with an uncorked bat. After initially entering the city science fair I retested this concept but in much greater depth. Testing ten times every three centimeters from the end of the bat to try to discover if corking the bat will change the "sweet spot" on the bat, a spot which is supposed to hit the ball further. I hypothesized that corking would move the sweet spot closer to the handle because corking moves the center of gravity towards the handle.
There is a so called "trampoline effect", however, it is not enough to overcome the mass lost. Players here and there are still caught using this form of cheating and each has shown at least some improvement in statistics during the period of use. The reason behind the statistic boost is can most likely be attributed to the increased control of the bat. The batter can make better contact more often, thus raising the batting average of the player. Much data can still be collected on this interesting topic.

PROJ# S 5

NAME: Marsha Jones **GRADE:** 12

GENDER: Female

SCHOOL: Campagna Academy Charter School

PROJECT TITLE: Controlling Diabetes. Which fiber binds glucose best?

ABSTRACT:

The purpose of my project is to see which dietary fiber binds glucose best?
I prepared solutions 2000 mg/dl, 1000 mg/dl, 750 ml/dl, and 250 mg/dl. Tested each with glucose reagent strips to determine how accurately I could measure glucose in solutions. I prepared a 2000 ml/dl solution of glucose: I put 10 ml into each set of tubes. I then added 1g, 2g, and 3g of rice bran into each tube. After 15 minutes I filtered out and tested the filtered bier by using glucose reagent strips. This process was repeated with wheat and oat bran. Tests were repeated using a beaker cordany 40 ml of glucose solution and 1, 2, 3, 4, 5, and 6 grams of fiber. The suspension of fiber was stirred for 5 minutes than filtered. The filtrate was tested for glucose reagent testing strips. I found that rice bran was the fiber that bound glucose better than any other fiber that I tested. Wheat and oat bran were also very effective. They were not effective as the rice bran was. Rice bran bound nearly twice the glucose of the other fiber. When six grams was added to the container with 40 ml of the average amount of glucose bound by the rice bran
was nearly double the amount bounded by the other types of fiber. Bound glucose is absorbed more slowly then freely glucose. This cause the blood glucose levels to rise more gradually and be sustained over a period of time. All fiber binds glucose and is thus effective in helping control glucose. I found that rice is more effective than other fibers that I test.

PROJ# S 6

NAME: Emily Kerns **GRADE:** 12

GENDER: female

SCHOOL: Noblesville High School

PROJECT TITLE: Studying the Presence of E. coli 0157:H7 in Bos taurus fecal matter

ABSTRACT:

A study was done five years ago on the water quality and habitat assessment for the Stony Creek Watershed in Hamilton County, Indiana. The study discovered that high concentrations Escherichia coli were found in the water where livestock on the property had access to the water. Pollution going into the water system could cause higher water bills. If there were water samples taken from six different bodies of water, that border farm land and six different locations at farms with livestock with bodies of water boarding it, then it would find out that the locations that had livestock would have high concentration of Escherichia coli then the locations that had just had farmland.

Levels of Escherichia coli were determined by using Coliscan and plating the gel for forty-eight hours and testing the water for nine common pollutants: Ammonia Nitrogen, pH, Chlorine, Chromium, Copper, Nitrate Nitrogen, Phosphorus, Silica, and Sulfide. The Coliscan measures how many coliform bacteria and Escherichia coli are in the water. The Coliscan showed a p-value of .001 in the coliform bacteria for livestock, proving it was highly significant. However, with the Escherichia coli, the p-value of .22 for livestock, proving it is not significant.

With the data collected, the project shows Bos taurus doesn't exert a significant amount of Escherichia coli into the water system compared to the regular farmland surrounding them. However, if tests were completed in the summer months when the Bos taurus is more active, Escherichia coli might spike and show a significant difference.

PROJ# S 7

NAME: Kayla Mays **GRADE:** 12

GENDER: Female

SCHOOL: Campagna Academy Charter School

PROJECT TITLE: Which Light Bulb is Better

ABSTRACT:

The purpose of this project is to compare the energy usage, heat production, and light production of incandescent, fluorescent, and light emitting diode light bulbs. It is to determine which light bulb is more energy efficient. The light emitting diode light bulbs were too expensive, so I bought a box of L.E.D Christmas lights and wrapped them around an empty toilet tissue roll to make a bulb. I placed the light fixture in the box, and placed the Hobo light and temperature sensor in, and then I closed the lid. I turned on the light and recorded the light and temperature for thirty minutes. The maximum temperature and lumens per square foot were recorded and compared.

 The average lumens for the incandescent bulb were 9.9 lumens/ft sq. and over a period of thirty minutes, the bulb produced a 7.7 º C increase over ambient temperature. The fluorescent bulb produced 24.94 lumens/ft sq. and over a period of thirty minutes, it produced 2.3 º C increases over the ambient temperatures. The L.E.D bulb produced 2.60 lumens/ ft sq. and no increased temperatures.

In conclusion, the fluorescent bulb would be the best to use if a person wants to save money, use less electricity, and save energy. This bulb does have down falls though. It doesn't put out a great amount of light, and it takes a while for the bulb to heat up.

PROJ# S 8

NAME: Brianna Morris **GRADE:** 11

GENDER: Female

SCHOOL: Eastern High School

PROJECT TITLE: Determining How Temperature Affects the Phenology of Vanessa cardui

ABSTRACT:

Butterflies are known to be poikilothermic, making their life-cycle highly dependent on temperature. This makes them an ideal study group for examining the effects of climate change (Filella, Penuelas and Stefanescu, 2003). This project was designed to determine how temperature affects the phenology of Vanessa cardui. It was hypothesized if Vanessa cardui pupae were exposed to various temperatures, then the pupae exposed to the warmest temperature would emerge form their chrysalids first. For this project, Vanessa cardui larvae were purchased. Once the larvae made their chrysalids, they were placed into one of three originally designed habitat chambers. The habitat chambers were 40 cm by 40 cm boxes constructed of building insulation. Trial runs were conducted to obtain the optimum high and low temperatures based on a control temperature of 24 degrees Celsius. In the warmer habitat chamber, a heating pad was placed in the bottom of the insulated box. In the cooler habitat chamber, a Polar Care 300 ice water pump was placed in the top of the insulated box. Nothing was placed into the control habitat chamber. Digital thermometers were placed into the habitat chambers. One strand of white Christmas tree lights connected to timers set to 12 hours of light and 12 hours of dark were placed in each habitat chamber. Three separate 30 cm by 30 cm nylon screen boxes, were placed inside the habitat chambers to house the pupae during experimentation. The average developmental rates for all three groups are as follows: Group A(warm)-141.63 hours, Group B(control)-181.76 hours, and Group C(cool)-247.03 hours. F-tests were run to calculate variance in order to determine which Student's t-Test to use. Based on the p values of the t-Tests, the differences between all three groups was significant, but the greatest significance was found between groups A and C ($p=.001$). Based on the data collected, the hypothesis was supported.

PROJ# S 10

NAME: Carissa Pekny **GRADE:** 9

GENDER: Female

SCHOOL: West Lafayette Jr/Sr High School

PROJECT TITLE: Is Hemoglobin or Hemocyanin More Efficient in Oxygen Absorption When Undergoing Environmental Changes?

ABSTRACT:

Hemoglobin and hemocyanin are both proteins that work in oxygen transportation in different organisms. These proteins differ in structure, however they perform the same function. At one time, one molecule of hemoglobin is able to bind to up to four oxygen molecules while two molecules of hemocyanin are only able to successfully bond to one oxygen molecule at a time. Hemoglobin and hemocyanin are the two most efficient proteins in oxygen transport of all oxygen-carrying proteins in biological organisms. Dissolved oxygen was measured in hemoglobin and hemocyanin solutions in various pH's and temperatures to decide which protein was most effective in retaining oxygen. The two proteins were separately dissolved in three solutions (with 50mL of pH buffer) with pH's of 6.8, 7.4, and 8.0 (two proteins, three pH's=six separate containers to be tested). Each of the six containers containing either dissolved hemoglobin or hemocyanin and a pH solution was heated by approximately 5 degrees Celsius (from room temperature-about 24 degrees Celsius- to closer to normal human body temperature-about 29 degrees Celsius). Hemocyanin proved to retain more dissolved oxygen at lower temperatures and at pH 8.0. Hemoglobin retained more oxygen at pH 7.4 and higher temperatures (the Bohr effect took place). Hemocyanin's ability to function at lower temperatures is explained by the organisms that utilize the protein. Hemocyanin tends to appear in arthropods and crustaceans that live under colder conditions and low oxygen pressure. Organisms that contain hemocyanin could have major problems producing hemocyanin and retaining oxygen if the ocean's temperatures continue to rise in the future.

PROJ# S 11

NAME: Micaela Crites **GRADE:** 9

GENDER: Female

SCHOOL: Northwestern Sr High School

PROJECT TITLE: The Turfinator

ABSTRACT:

The purpose was to discover which cool season grasses are most tolerant to extreme heat, cold, drought, flood, shade, and light. If fertilized cool-season turfgrasses were exposed to extreme heat, cold, drought, shade, and flood, then the fescues will grow the most in the shade, drought, and cold while the ryegrass and bluegrass will grow better in the heat and flood. Five cups of each type of grass were put under shade, heat (85°F), cold (44°F), flood, and drought conditions. Each day the tallest blade of grass from the top of the cup was measured; all the grass was then cut. The best grasses for the cold were tall fescue; heat, Kentucky bluegrass; flood and drought, tall fescue; and shade, perennial ryegrass. The measurement heights of tall fescue control ranged from 1.6-0.9 cm and on day two 0.9 cm to 6 cm. The creeping red fescue was affected by shade with control height 3.8-9.3 cm and the shade 0.1-0.7 cm. The chewing fescue was affected by all conditions but the heat with control heights 4-6.8 cm and shade, 2.6-5.1 cm. The Kentucky Bluegrass was affected by the shade and cold with control heights 3.5-7 cm and cold 2-3.7 cm. The perennial ryegrass was affected by the heat and shade with control heights 2.5-6.1 cm versus the heat 5.9-7.4 cm and the shade 0- 1.1 cm. In conclusion, the tall fescue would be the dominant choice for all conditions because statistically tall fescue was least affected by flood, cold, and shade.

PROJ# S 12

NAME: Stephanie Pitman **GRADE:** 10

GENDER: Female

SCHOOL: Home Schooled

PROJECT TITLE: Regeneration of Acid Denatured Green Fluorescent Protein: The Kinetics of Chaperonin-Assisted vs. Spontaneous Protein Renaturation

ABSTRACT:

Chaperone proteins GroEL and GroES, which are beneficial in the refolding of damaged proteins, are two of the most studied chaperone proteins. In my experiments, I used this chaperonin complex to assist in the renaturation of my acid denatured green fluorescent protein in comparison with spontaneous renaturation of the same denatured protein. The reason that these proteins are studied is because many of the top causes of death in our country are misfolded protein related. Alzheimer's, Huntington's and sickle cell anemia, are all caused by misfolded proteins that cannot be refolded into their original state, thus causing damage within the cell. My original question was whether the renaturation device used by the green fluorescent protein is a spontaneous refolding or if it is an active enzymatic mechanism. In order to determine the answer to this question, I used a fluorometer to measure the change in fluorescence between the denatured protein solutions and the protein solutions after the two different renaturing methods. The original plan was to perform this experiment at three different temperatures and compare the kinetics of refolding. However, the denaturing process appeared to irreparably damage the GFP beyond which spontaneous renaturation could occur. So the project changed to asking can chaperonin proteins GroEL and GroES assist in the repairing of GFP damaged by acid denaturation. Some increase in refolding was noted with the chaperone assistance but the damage was beyond what GroEL and GroES could even effectively repair.

PROJ# S 13

NAME: Junia Ray **GRADE:** 9

GENDER: F

SCHOOL: Lighthouse Christian Academy

PROJECT TITLE: Vertigo

ABSTRACT:

QUESTION: Are some people more susceptible to forces that cause "dizziness," ie, vertigo, and can this be domonstrated objectively? The inner ear is a very delicate and yet exquisitely developed instrument tht provides a sense of balance. This "ear" is composed of a "vestibular system," (semicircular canals and otolithic organs), which are "wired" by nerve connections through the brain to the eyes and to muscles. SUMMARY: Subjects spin themselves for 15 seconds, and the duration of their vertigo, as measured by the duration of nystagmus, is measured and compared. HYPOTHESIS: Some people are more susceptible to developing vertigo, which can be shown objectively, and measured, even when only crude instruments are available. CONCLUSION: The hypothesis is confirmed.

PROJ# S 14

NAME: Gwyn Snow **GRADE:** 10

GENDER: Female

SCHOOL: Northview High School

PROJECT TITLE: The Effects of Ultraviolet Light on E.coli

ABSTRACT:

The Effects of Ultraviolet light on E. coli

Recently, there have been too many instances of E. coli contamination of fresh foods making people sick. This experiment was designed to look at the effects of ultraviolet radiation on E. coli. Instead of using fruit that could be carrying other contaminants, the decision was made to use straight E. coli and reduce the number of uncontrollable variables. Science class rooms around the country have been installed with ultraviolet goggle cabinets for years. This controlled environment helped in the process of this experiment by reducing the number of underlying independent variables and became in its self a control. Then the results were tallied using an acetate graph and counting the number of squares that were by area more than half full. Time was used to measure the amount of exposure on the nutrient soy agar plates. Early results look to support the hypothesis that there would be a decrease in the amount of visible E. coli on the plates as they were exposed to increasing amounts of ultraviolet radiation.

PROJ# S 15

NAME: Janelle Thixton **GRADE:** 12

GENDER: Female

SCHOOL: Eastern High School

PROJECT TITLE: Workplace Adaptations for People with ADHD: A Feasibility Study

ABSTRACT:

People with Attention Deficit Hyperactivity Disorder (ADHD) are protected by the Americans with Disabilities Act; however, since previous research has revealed misconceptions about ADHD in the workplace, some individuals with ADHD may choose to implement workplace adaptations instead of seeking formal protection from the law. This project explored the efficacy and feasibility of workplace adaptations for people with Attention Deficit Hyperactivity Disorder (ADHD). It was hypothesized that mental health professionals would find most of these adaptations effective for people with ADHD and office employees would find most of the adaptations feasible to implement. Two Likert scale surveys were created; one asked mental health professionals to evaluate the efficacy of the adaptations, and the other asked office employees to evaluate the feasibility of allowing an employee to implement the adaptations. Office employees at Indiana University Kokomo, Bellarmine University, University of Louisville, Spalding University, and Floyd Memorial Hospital were surveyed in person; this survey was also administered to office employees at other hospitals using the website Survey Monkey (www.surveymonkey.com). Office employees were separated into office staff members, office administrators, and non-office staff members. Mental health professionals were surveyed using email and Survey Monkey. A total of 126 surveys were received. Twenty came from mental health professionals, 77 came from office employees at colleges, and 29 came from office employees at hospitals. The average ratings for each adaptation were calculated. An average rating of six was considered an endorsement of an adaptation's efficacy or feasibility. Only two adaptations received an average rating lower than six from the mental health professionals. The adaptations were "Occasionally working from home" and "Requesting frequent meetings with coworkers when working on a project." Two adaptations received an average rating lower than six from the office employees from colleges; they were "Occasionally working from home" and "Requesting a private workspace." Only one adaptation ("Occasionally working from home") received an average rating lower than six from the office employees from hospitals. ANOVA was used to compare the responses of office administrators, office staff members, and non-office staff members from each employment category on each statement. The ANOVA calculated on the hospital employees' responses to adaptation six showed a significant response ($p = .002$). The F-Test was used to compare the variances of the groups in pairs to determine which version of Student's t-Test to use for each pair. When Student's t-Test was used to compare the groups' responses to adaptation six, no significant differences were found. Because there were no significant differences between the groups within each employment category, the responses of the whole employment categories were examined. The responses of the college employees and hospital employees to each adaptation were compared using F-Test and Student's t-Test as used before. No significant differences were found. Since seven of the ten adaptations were evaluated as both effective and feasible by all groups, the hypothesis was supported.

PROJ# S 16

NAME: Victoria Westrich **GRADE:** 12

GENDER: F

SCHOOL: Paoli Jr-Sr High School

PROJECT TITLE: Ramification of the Companionship of a domesticated Animal on Human Blood Pressure.

ABSTRACT:

The purpose of the research was to observe if having a pet has a positive effect on the human body. Fourteen subjects with pets were chosen. The subject's blood pressure was taken and recorded. Then the subjects were asked to either perform verbal spelling or mental arithmetic for fifteen minutes. Their blood pressure was taken and recorded. For the first trial, they were to recuperate by interacting with their pet, for fifteen minutes. The second trial, they were asked converse with the researcher for fifteen minutes. After recuperating, their blood pressure was taken and recorded. A test for statistic paired differences was used to calculate T. The difference in the post stressor and the post with and without the pet was calculated. The post stressor systolic and diastolic was divided by the systolic and diastolic differences to get the percent in difference. Standard deviation, the percentages, and the number of subjects were placed into two separate T- test, one for systolic and one for diastolic. The assumption was that there was no difference. The value of T for diastolic was greater than the critical value of T so the conclusion is that there was change in the diastolic when the pet was present. The value of T for systolic was less than the critical value, so there was no conclusion about the systolic number. The conclusion is that having a pet and interacting with it does have a positive effect on the diastolic number of the human blood pressure.

PROJ# S 17

NAME: Kevin Dywan **GRADE:** 12

GENDER: Male

SCHOOL: Boone Grove High School

PROJECT TITLE: Pushing Pennies

ABSTRACT:

The purpose of this project was to design an apparatus to decrease the acceleration of an automobile, thus increasing the mileage. Possible concepts were considered to lower the linear speed of the throttle control cable: fluid piston, vacuum actuator, air control piston, or electronically controlled motor. This evaluation involved the consideration of possible problems involving the battery, cruise control, and other components. After considering all the problems associated with each design and situations it might encounter, it was determined that the best design would be an air-control piston. This contains a single piston controlled by the flow of air from the chamber out of the piston. It was further determined that when entering a highway it would require faster acceleration, thus above 40 mph, the acceleration is increased to the original capabilities of a car through a release hose. When stopping, a motorist requires a high level of de-acceleration, which was obtained by a quick air intake piston head. The resulting design was machined and the hardware was connected.

The device put a cap on the acceleration at speeds below 40 mph increasing the mpg by approximately 20% over the normal capabilities of the vehicle. This was determined by timing the lineal speed of the throttle control cable to get to full throttle at different air release rates. A test was also conducted on a car by controlling the acceleration rates by using different driving styles. For safety reasons, an unapproved and untested device could not be tested on the road. This device could help lower the demand for gas and the dependence on foreign oil supplies.

PROJ# S 18

NAME: Kathryn Merkling **GRADE:** 9

GENDER: female

SCHOOL: East Noble High School

PROJECT TITLE: Correlation Between Word Association and NWEA Score

ABSTRACT:

Title: Word Association Correlating to Reading, Language, or Math Assessment Tests Purpose: The objective of this project is to see if student's word associations correlate to what their best subject is between reading, language, or math. Hypothesis: If students are tested to see what their word associations are correlating to what their best subject then there will show to be correlation between how they associate words and what their best subject is between reading, language, and math.

PROJ# S 19

NAME: Gabriel Stephens **GRADE:** 10

GENDER: male

SCHOOL: East Noble High School

PROJECT TITLE: Honey = Antibiotic

ABSTRACT:

The question to be answered was: Is honey as effective as conventional antibiotics at inhibiting gram-negative bacterial growth? To quantify this, a measurement of bacterial growth was necessary. The way this was done was to measure transmittance levels between broth cultures among different antibiotic and honey treated groups. A lower level of transmittance compared to the control meant that a group was more effective at inhibiting bacterial growth. These values were then run through a Student's t-test to ensure a constant way of measuring statistical significance. So, all in all, if a given t-test result's p-value was in the same statistical range as another, they were equally as effective at inhibiting bacterial growth. To supplement and validate this data, a zone of inhibition test was also performed. The data found corroborated the hypothesis. Honey prevents bacterial growth effectively at concentrations of 20% in E.Coli, and at concentrations of 10% in Enterobacter Aerogenes. Further study could be done into this subject, to find the exact level that honey is no longer effective at inhibiting bacterial growth.

PROJ# S 20

NAME: Kayleigh Warner **GRADE:** 10

GENDER: female

SCHOOL: DeKalb High School

PROJECT TITLE: Foundry Sand: Waste or Beneficial Phase IV

ABSTRACT:

I tested the effects of foundry sand on soybeans yeilds in a filed seting. I also tested the amount of metals in the beans

PROJ# S 21

NAME: Mollie Daily **GRADE:** 9

GENDER: Female

SCHOOL: Northwestern Sr High School

PROJECT TITLE: A Study in Stress Management

ABSTRACT:

The purpose was to determine what causes stress in people of differing ages and genders and to find stress relievers. The hypothesis is if older working males have more occupational responsibilities, then they experience more stress. Equal numbers of males and females from the following age groups (teenagers 15-24, young adults 25-44, middle age 45-64, and retired 65+) took the same questionnaire about their lives within the last six months. The results were statistically supported when comparing middle aged men to middle aged females as 8/12 females and 11/13 males have endured difficult struggles (X^2=24.25,df=3). Four of twelve females and 9/13 males felt it was difficult to maintain economic support. Nine of 13 males were stressed but were not statistically supported (X^2=10.25,df=3.) Eighty-four percent of middle aged males and 50% of young males said they had trouble with finance (X^2=6.22,df=3.) When asked if their families were dealing with financial difficulties, 61.5% of middle aged males and 58.3% of young adult males responded yes (X^2=1.026,df=3.) Sixty-nine percent of middle aged men and 16.6% of young adult males say that they have had difficulties economically supporting all for whom they are responsible (X^2=7.258,df=3.) Lastly, 44.4% of middle aged men and 33.3% of young adult males feel as if they have been working too much within the last six months (X^2= 6.256,df=3.) The most effective stress relievers for the males were exercising, reading, and music, and the most effective stress relievers for females were actively reading and consuming healthier foods.

PROJ# S 22

NAME: Joseph Tadros **GRADE:** 11

GENDER: M

SCHOOL: F.J Reitz High School

PROJECT TITLE: Determining Optimal Absorbance in UVA and UVB Ranges of Various Sunscreens

ABSTRACT:

The purpose of this experiment was to figure out which is the most and least effective sunscreen out of 11 different kinds. Some famous tested types included: United Healthcare, Coppertone, Aveeno, Neutrogena, Max Block, and Banana Boat. This is important as it can determine which brands costumers should buy for the cheapest price or get their money's worth. Sunscreens are the primary shield against skin cancer, which is notorious for contributing to the most deaths annually in the U.S. out of all cancer types. To test this, 0.256g sunscreen samples were dissolved in ethanol, placed in cuvets, and run through a USB4000 Miniature Fiber Optic Spectrophotometer. Using this technology and the installed software, different UV absorbance spectra (280-400nm) and data collected on certain wavelengths was obtained for each different sunscreen. The Aveeno Moisturizer SPF 15 sunscreen performed the best out of the delegates having absorbance readings of 1.840 and 2.508 at 300.35nm and 359.99nm respectively. At its peak, it reached an absorbance value of 2.647. The least effective sunscreen with the lowest absorbance values was the Olay Moisturizer SPF 30 having values of 1.739 and 0.202 at 300.35nm and 359.99nm respectively. Despite the numbers, nevertheless, there wasn't a huge difference between the sunscreens: only by a few hundredths. Two generalized spectrum patterns were also observed. In conclusion, people should buy the Aveeno Brands if they are really concerned about skin cancer, but overall absorbance values were so close that buying cheapest sunscreen available would be preferred to save money.

PROJ# S 23

NAME: Patrick Worthey **GRADE:** 9

GENDER: male

SCHOOL: East Noble High School

PROJECT TITLE: Effects of Second Hand Smoke on Cilia

ABSTRACT:

This project was designed to see how second hand smoke affects the cilia's ability to function normally. The project was created by researching the harmful effects of second hand smoke and finding what could be tested to find changes. The thing that makes this project unique is that cilia are being tested instead of lung capacity. The tests that were found online were testing the performance of the person being affected by the smoke as opposed to testing the actual cilia. Research was conducted on the changes different types of smoke exposure had on the cilia on a stentor cell. The procedure started with testing the time it took for the cilia to fully extend after they preformed their recoiling action. Then different types of second hand smoke were added to the stentor culture starting with the smoke I collected from the restaurant. Then a new stentor culture was place in an air tight chamber eight inches away from a burning cigarette. Once these tests were done the stentor were place on a slide and using an eye dropper a nicotine solution was placed on the edge of the cover slip. The solutions were as follows: 2%, 0.2%, 0.02%, and 0.002%. In conclusion the data from the research did show that the stronger the nicotine concentration in the smoke the more it affected the cilia's ability to function.

PROJ# S 24

NAME: Joseph Hong **GRADE:** 11

GENDER: M

SCHOOL: Bloomington High School South

PROJECT TITLE: Potential Early-Dectection Biomarker Proteins for Kidney Disease and Renal Cell Carcinoma in Mouse Cortecal Tubule Cells

ABSTRACT:

A kidney has extensive renal reserves that mask the early symptoms of the disease, frequently making the disease go undetected until it has progressed to the point of driving kidney to failure. To find a non-invasive biomarker that would reliably detect the presence of diseased kidney cells, proteins released by healthy rodent kidney cells and those released by disease-simulated kidney cells were compared to one another and any difference between the two were analyzed. Using protein gel electrophoresis and western blotting thechniques, proteins of various molecular masses were visualized to the point where presence and concentration of various proteins excreted by cells could be easily detected. Proteins were extracted from media the cells were grown in, and to simulate the real life of kidney as much as possible, wells inserted with transwells were used to grow the rodent kidney cells. The cells were grown on top of the porous membrane of transwell, and beneath the transwell and above the transwell placed were the media. This simulated blood being filtered from beneath the transwell and all filtered solutes and proteins excreted by the cells being secreted above the transwell. Media above the transwells were extracted and analyzed for presence of protein, and any difference between media used by health cells and media used by diseased cells were recorded. The results show that a protein with molecular weight of approximately 60kDa was secreted into urinary side of transwell while none was secreted to the blood side of the transwell, and therefore this protein could be one of many potential biomarker indicator proteins for kidney disease, as absence or presence of such proteins could mean some kidney cells may be injured.

PROJ# S 25

NAME: Craig Schebler **GRADE:** 9

GENDER: M

SCHOOL: Greensburg Community High School

PROJECT TITLE: The Effects of a Hydrogen Fuel Cell on Lawnmower Performance

ABSTRACT:

The purpose of these experiments is to find out if a hydrogen fuel cell will improve the speed and performance of a lawnmower. A hydrogen fuel cell uses electrolysis to turn water and electrolyzer into HHO or hydrogen. The hydrogen is then burned as fuel. Electroysis of water is when an electrical current is used to separate the oxygen and hydrogen chemical bonds. Electrolysis of pure water is slow, so an electrolyzer is added to speed the process. Salt, acids, or a base is normally added, and baking soda was used for these experiments. Hydrogen alone can't be used as a fuel source, but it's used as an additive to help improve performance. First, a hydrogen fuel cell was attached to a lownmower. A 50 yhard path was marked on dry pavement and the lawnmower was driven on the path at full speed with and without the hydrogen fuel cell. The times were recorded. The lawnmower ran an average of one second faster with the hydrogen fuel cell. Next, the lawnmower sat at idle speed with only 50 ml of gas. The amount of time that it took before the lawnmower ran out of gas was recorded. The procedure was repeated with the hydrogen fuel cell. The lawnmower ran an average of 29 seconds longer with the hydrogen fuel cell. Another observation was that the lownmower ran smoother with the hydrogen fuel cell. These experiments prove that a hydrogen fuel cell does improve the speed and performance of a lawnmower.

PROJ# S 26

NAME: Elise DeBuysser **GRADE:** 12

GENDER: Female

SCHOOL: Marian High School

PROJECT TITLE: The Effects of Desiccation on the Biomass of Myriophyllum spicatum

ABSTRACT:

One problem in controlling the spread of invasive aquatic plant species is the ability to reproduce by fragmentation. Due to human movements, namely boats and boat trailers, Myriophyllum spicatum fragments are easily transported. There remains the question of the fitness (survival and reproduction ability) of these fragments due to desiccation (drying) during transport, and the threat these desiccated fragments present to ecosystems. Eurasian Watermilfoil is a very destructive invader; it produces thick vegetative mats that displace native aquatic plants, interfere with hydrology, and adversely impact sport-fish.

In this experiment, M. spicatum fragments of varying lengths (3-23 cm) were air-dried for a range of time periods (0-24 hours). Following desiccation, the fragments were placed in a tank of water in individual jars and their recovery, survival, and root formation was monitored for 6 weeks. A time-biomass comparison analysis was conducted to show the relationship between new growth and the time it took the fragment to develop roots. For control fragments, which received no desiccation treatment, survival and root production readily occurred across all fragment lengths, and the time for root production was less than two weeks. As a result, these fragments produced more biomass than fragments that were desiccated. Fragments that experienced desiccation for 5 or 24 hours posed little or no risk of surviving or initiating root production. In contrast, bunched fragments, even those desiccated for 5 hours survived and produced more biomass on average than the single fragments. It is believed these results and similar analyses on other aquatic invasive species can increase the effectiveness of management efforts by considering fitness loss in the transport pathway.

PROJ# S 27

NAME: Emily DeWitt **GRADE:** 11

GENDER: Female

SCHOOL: Terre Haute North Vigo High School

PROJECT TITLE: Adaptation of E. coli to Ultraviolet Radiation

ABSTRACT:

Escherichia coli are acknowledged for their ability to develop resistance to antibacterial treatments. One may begin to wonder how resistant E. coli are to other methods, such as UVGI: ultraviolet germicidal irradiation. I hypothesized that E. coli that repeatedly survives significant ultraviolet radiation will develop ultraviolet radiation resistance, because the radiation increases the chance of a useful mutation while pressuring the E. coli to develop radiation resistance.

To test this hypothesis, I ran multiple trials. Cultures of high school E. coli on soy agar in Petri dishes were exposed in trial groups to determine the minimum exposure time necessary to kill the culture. Then, a trial group was exposed multiple times over the course of weeks; periodically, a sample was exposed for the kill time, indicating the presence or absence of UV resistance. Photographs recorded growth of the cultures. After experimentation, all cultures were killed with 10% bleach solution.

Conclusive results have emerged. The thickness of the colonies in the first trial group protected the cells on the inside. Of the kill tests from the repeated exposure groups, only two cultures survived: ones that reached a balance between resistant traits and overly weakened structures. This entire project would benefit from another trial group being tested in the future, as well as several changes in data collection.

PROJ# S 28

NAME: Mark Elia **GRADE:** 10

GENDER: Male

SCHOOL: Terre Haute North Vigo High School

PROJECT TITLE: What colors are easier to detect at low intensities of light?

ABSTRACT:

In this experiment I was trying to determine which colors are easier to detect at low intensities of light. My hypothesis was that colors whose wavelengths are closer to the median visible light wavelength (550nm) will be easier to see in low intensities of light and colors whose wavelengths are further from the median visible light wavelength will be more difficult to see in low intensities of light. To do this I designed an apparatus to allow me to control light intensity. I had the subjects look through the aperture and indicate when they could detect the color. After testing 17 subjects at varying intensities and color combinations I found that the data shows that white was the color that was seen at the lowest intensity of light followed by yellow, then orange, then green, then red, then blue, then purple, which was seen at the highest intensity of light. The results indicate that the hypothesis is supported.

PROJ# S 29

NAME: Lisa Fink **GRADE:** 12

GENDER: female

SCHOOL: Noblesville High School

PROJECT TITLE: Fighting Fabric Fading: Using Mordants to Maintain Textile Color

ABSTRACT:

Constant washing threatens the durability of natural dye colors in fabrics, especially in antique or historical textiles. Mordants, however, can prevent or decrease this color fading by chemically binding dye material to wool fabrics. The purpose of this project is to determine which mordant best maintains the color of certain natural dyes in wool textiles. Alum was hypothesized to best hold the indigo, black oak, and onion skin dyes, while tin was hypothesized to best hold the logwood and cochineal dyes.

The wool skeins were first mordanted with either alum, copper (II) sulfate, iron, or tin, while a control group of skeins was left unmordanted. These skeins were then dyed with either logwood chips, indigo, black oak sawdust, onion skins, or cochineal. The initial color of the wool skeins was determined by measuring the skeins' colors according to the Munsell Book of Colors. All skeins then underwent a series of washes, and the color of each skein was measured again after each wash.

A linear regression analysis of the number of washes vs. the resulting change in the color scale was conducted for each treatment. The regression lines for no mordants had the least slope for both the black oak and cochineal dyes, the alum regression line had the least slope for the indigo and onion skin dyes, and the iron mordant regression line had the least slope for the logwood dye. However, some regression lines had extremely low R^2 values, demonstrating that the regression models did not fit the data well.

Based on their least slope values, no mordant was found to best hold black oak and cochineal dyes, alum best maintained the color of indigo and onion skin dyes, and iron best held the logwood dye. P-values below .0001 indicate that these results would not likely occur as a result of random sampling variation, given that the null hypothesis is true. However, because of the low R^2 values, more washes should be completed to find more accurate regression models. This experiment could be expanded upon by exposing the treated wool to sunlight and then measuring how the mordants affect the dyes' colorfastness.

PROJ# S 30

NAME: Jack Fruth **GRADE:** 10

GENDER: Male

SCHOOL: Northwestern Sr High School

PROJECT TITLE: The Implications of Chrysanthemum Blossom Extract on Mealworms and Fruit Flies

ABSTRACT:

The purpose was to determine whether chrysanthemum blossom extract could be used as a natural pesticide to kill mealworms and fruit flies. The solution was added to both insects in 3 jars with 5 insects in each (giving 15 replicate samples) at 0%, 25%, 75%, and 100% solutions. Data were taken in increments of 1, 3, 4, 5, and 7 days (slightly modified for fruit flies). The fruit flies were fed the standard medium with the extract concentrations and the mealworms were fed cooked pasta soaked in the solutions. Two preference tests were preformed on both insects (using the Wards Biological Behavioral Tray) using bananas and potatoes. In addition, both insects were tested on survival rate and their movement pattern (taxis or kinesis). The preference tests involve a testing arena with 4 different food choices and showed no difference between wet control samples and solution soaked samples (though wet vs. dry samples had an effect). The movement pattern test also showed that neither insect had a modified movement after solution exposure. For survival data ANOVA was used and showed statistical significance for fruit flies (to greater than a 99.8% confidence level with an F value of 13). The extract killed the fruit flies. The extract did not work, however, on the mealworms at any concentration. The ANOVA calculations for survival rate of the mealworms only show an F value of 1.48 corresponding to only a 72.6% confidence level.

T

PROJ# T

NAME: Katie Shew

Haley Tisdale

GRADE: 11

GENDER: Female

SCHOOL: Terre Haute North Vigo High School

PROJECT TITLE: Comparison of Power: Sprint vs. Distance

ABSTRACT:

The object of this experiment was to observe whether or not the force of an athlete's jump affects his or her athletic performance. Our hypothesis was that there is a correlation between the force to weight ratio and a swimmer's ability to compete as a sprint or distance swimmer. In order to conduct this experiment, numerous swimmers were asked to swim a 50-yard and 400-yard freestyle for time so they could be classified into either the sprint group or the distance group. Next, the swimmers performed their jumps on the digital force sensor and the results were collected as data. The swimmers were studied throughout the winter swimming season. Their times at the beginning of the season and the end of the season for their best event(s) were recorded. The times were compared and the swimmers were re-categorized into the two groups once again. The swimmers performed their jumps on the digital force sensor for a second time and the data recorded. These results for the after-season were compared to the pre-season results to discover whether or not the hypothesis was correct.

PROJ# T

NAME: Michael Higgins

Harvet Jones

GRADE: 11

GENDER: Male

SCHOOL: Lew Wallace High School

PROJECT TITLE: Wii vs. Exercise

ABSTRACT:

The purpose of our project is to determine which will get your heart beating faster, exercising using the Nintendo Wii gaming system or going out and actually doing the exercises it attempts to emulate. Our hypothesis is that exercise will increase you vital statistics more than playing the Wii game. To help us find the answer to this question we first had to gather 20 students. After doing so we tested their heart rates prior to doing any physical activity. Next we had them each play the Nintendo Wii for 3 minutes. The game we chose for them to play was Wii Sports Boxing. Using a pc application called Logger lite and a Vernier heart rate and blood pressure probe, we were able to acquire each participant's heart rate and Pressure. After taking everyone's heat rate, systolic and diastolic pressure, and their mean arterial pressure, we had them exercise for three to ten minutes. Since boxing requires a lot of movement on your feet, we decided to have them run for three to ten minutes as an equivalent to the time playing the game. After the exercising we tested their heart rates for the third time. Finally after all the testing, we discovered that playing the Wii game did increase the heart rate slightly while lowering the blood pressure, while running increase both the heart rate and the blood pressure extremely more that just playing the game.

PROJ# T

NAME: Sara Feeler

Courtney Beach

GRADE: 11

GENDER: Female

SCHOOL: Eastern High School

PROJECT TITLE: Determining the Effect of St. John's wort and Valerian on the Stress

ABSTRACT:

The purpose of this project was to determine the effect of the common herbals St. John's wort, Valerian, and a combination of the two on the stress levels of Daphnia pulex by observing their heart rates. It was hypothesized if Daphnia pulex were subjected to serial dilutions of the common herbals St. John's wort, Valerian, and a combination of the two, the greatest effect on their heart rate indicating stress would result from the combination of the two herbals. The null hypothesis was there would be no effect on the Daphnia pulex. An aquarium was set up to hold the Daphnia pulex. Algae, Scenedesmus, were used as the food source for the Daphnia. The Daphnia pulex were purchased from Carolina Biological. St. John's wort and Valerian were purchased from Chromadex, a supplier of botanical reference standards. An infusion was made using 5g of the powdered herb and 100mL of distilled water to make a standard herbal infusion. The infusion was filtered using a Büchner funnel and vacuum flask. The filtered infusion served as the 100% solution. Serial dilutions (75%, 50%, and 25%) were prepared from each of the herbal infusions. Ten Daphnia pulex were used to test each of the serial dilutions and a control. Each tested Daphnia was placed on a microscope well slide and the aquarium water was drawn away as the tested serial dilution was applied and allowed to sit for 20 minutes. The heart rates were then counted to determine the stress levels of the Daphnia. A toxicity test was used to determine the LC-50. ANOVA and Student's t-test were used to determine statistical significance. The average heart rate of the Daphnia control group was 172.2. The average rate of the Valerian 25% solution was 187.1, the 50% solution was 238.8, the 75% solution was 173.2, and the 100% solution was 125.8. The average heart rate of the St. John's wort 25% solution was 187.2, the 50% solution was 238, the 75% solution was 249.6, and the 100% solution was 222.3. The average heart rate of the combination of St. John's wort and Valerian 25% solution was 181.6, the 50% solution was 178.8, the 75% solution was 190, and the 100% solution was 213.6. The results of the toxicity test for the St. John's wort and Valerian were the Daphnia pulex in the 100% solutions died within 12 hours. The Daphnia in the 75% solutions died within 24 hours, the 50% solutions died within 36 hours, and the 25% solutions died within 48 hours. In conclusion, the Valerian had the greatest effect overall. Thus, the hypothesis was not supported, and the null hypothesis was rejected.

PROJ# T

NAME: Caitlyn Koscielski

Caroline Trippel

GRADE: 12

GENDER: Female

SCHOOL: Marian High School

PROJECT TITLE: Can Mass Spectra be Obtained Directly from a TLC Separation of Lipids from Mycobacterium avium?

ABSTRACT:

Tuberculosis (TB), a disease which afflicts millions of people, is caused by the organism Mycobacterium tuberculosis (M. tuberculosis). However, when studying the disease, the benign compound, Mycobacterium avium (M. avium), a member of the class of organisms that includes M. tuberculosis, is often used as a safer alternative. Studies have shown that the molecules located on the surface of M. avium, called glycopeptidolipids (GPLs), cause it to be recognized by a host immune system. These GPLs can be extracted and purified to determine their chemical structures. In a recent study, this process included the following time consuming steps: extraction of total lipids, separation of GPLs from this total lipid fraction using thin layer chromatography (TLC), removal of GPL bands from the TLC plate, and finally, chemical characterization by mass spectrometry. The purpose of this project is to determine if it is possible to use Imaging Mass Spectrometry to characterize directly the GPLs from the TLC surface. Imaging Mass Spectrometry can be performed using the technique of matrix assisted laser desorption ionization (MALDI). MALDI produces gas phase ions by using laser light energy to desorb material from a sample surface coated with a matrix compound. Therefore, it should be possible to add a thin coating of matrix directly to a TLC plate which contains separated GPLs. The resultant GPL ions can be detected by a time-of-flight mass spectrometer. The goal of this experiment is to determine if a reliable and reproducible method can be developed to obtain mass spectra of GPLs from a total lipid separation directly off the surface of a TLC plate.

PROJ# T

NAME: Joel Sampson

Hanna Lee, Jeffery Ginther

GRADE: 11

GENDER: male

SCHOOL: Heritage Christian School

PROJECT TITLE: Stayin' Alive: Can Exhaustion Kill?

ABSTRACT:

The purpose of this project is to design and create a device which can make administration of CPR “fool proof,” as well as reduce the exertion that the rescuer uses upon the victim. Proper CPR chest compressions require an awkward and uncomfortable hand position. Our device makes the hand position more comfortable.

The device is primarily made of a wooden frame, springs, and a pressure sensor. When one exerts a downward force upon the device, the springs compress, and at a designated pressure, the device beeps, which lets the user know they have applied enough pressure. The testing of the device consisted of four trials by individuals. They gave compressions for three minute periods, alternating use of the device with each trial. Sufficient time was given to the individuals between trials to recover. Exertion was measured by the heart rate. We used a pulsoximeter to get a constant reading of the heart rate. We hypothesized that the device would decrease the effort exerted, because the awkward hand position of traditional CPR compressions required use of muscles which are not as commonly used.

Upon completion of their trials, the test subjects commented upon the increased comfort of the device. The average change in pulse rate as a percentage of the baseline with the device was 28% lower than without the device. This led us to believe that less effort was needed to administer CPR compressions using the device

PROJ# T

NAME: Hannah Lee

Jeffery Ginther, Joel Sampson

GRADE: 12

GENDER: female

SCHOOL: Heritage Christian School

PROJECT TITLE: Stayin' Alive: Can Exhaustion Kill?

ABSTRACT:

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PROJ# T

NAME: Stephen Esposito

Stephen Esposito

GRADE: 11

GENDER: M

SCHOOL: Greensburg High School

PROJECT TITLE: Effect of Sleep Deprivation on Fruit Fly Mating Habits

ABSTRACT:

The purpose of this science fair experiment was to discover any change in the mating habits of fruit flies after sleep deprivation. During this procedure we kept a colony of Drosophila melanogaster awake for a period of 8 hours by keeping them on a gently rolling platform while simultaneously letting a colony of fruit flies sleep normally. Both colonies had the same media (food) and lighting circumstances. After the 8 hours was up, we transported each colony to a freezer until the became still. This allowed for us to correctly identify each fruit fly as either male or female. We then isolated 20 pairs of fruit flies, on pair at a time, in a petri dish and observed their mating tendencies. This step was done for both the sleep deprived fruit flies as well as the well rested fruit flies. We observed that only 3/20 pairs of the sleep deprived flies successfully mated and that 13/20 pairs of the well rested flies mated. Scientists sill cannot explain the importance of sleep deprivation. Sleep deprivation can effect mental, emotional, and social aspects of life, but until the purpose of sleep is discovered, humans will still have to get their sleep in order to stay well-rounded beings.

PROJ# T 1

NAME: Courtney Beach

Sara Feeler

GRADE: 11

GENDER: Female

SCHOOL: Eastern High School

PROJECT TITLE: Determining the Effect of St. John's wort and Valerian on the Stress Levels of Daphnia pulex

ABSTRACT:

The purpose of this project was to determine the effect of the common herbals St. John's wort, Valerian, and a combination of the two on the stress levels of Daphnia pulex by observing their heart rates. It was hypothesized if Daphnia pulex were subjected to serial dilutions of the common herbals St. John's wort, Valerian, and a combination of the two, the greatest effect on their heart rate indicating stress would result from the combination of the two herbals. The null hypothesis was there would be no effect on the Daphnia pulex. An aquarium was set up to hold the Daphnia pulex. Algae, Scenedesmus, were used as the food source for the Daphnia. The Daphnia pulex were purchased from Carolina Biological. St. John's wort and Valerian were purchased from Chromadex, a supplier of botanical reference standards. An infusion was made using 5g of the powdered herb and 100mL of distilled water to make a standard herbal infusion. The infusion was filtered using a Büchner funnel and vacuum flask. The filtered infusion served as the 100% solution. Serial dilutions (75%, 50%, and 25%) were prepared from each of the herbal infusions. Ten Daphnia pulex were used to test each of the serial dilutions and a control. Each tested Daphnia was placed on a microscope well slide and the aquarium water was drawn away as the tested serial dilution was applied and allowed to sit for 20 minutes. The heart rates were then counted to determine the stress levels of the Daphnia. A toxicity test was used to determine the LC-50. ANOVA and Student's t-test were used to determine statistical significance. The average heart rate of the Daphnia control group was 172.2. The average rate of the Valerian 25% solution was 187.1, the 50% solution was 238.8, the 75% solution was 173.2, and the 100% solution was 125.8. The average heart rate of the St. John's wort 25% solution was 187.2, the 50% solution was 238, the 75% solution was 249.6, and the 100% solution was 222.3. The average heart rate of the combination of St. John's wort and Valerian 25% solution was 181.6, the 50% solution was 178.8, the 75% solution was 190, and the 100% solution was 213.6. The results of the toxicity test for the St. John's wort and Valerian were the Daphnia pulex in the 100% solutions died within 12 hours. The Daphnia in the 75% solutions died within 24 hours, the 50% solutions died within 36 hours, and the 25% solutions died within 48 hours. In conclusion, the Valerian had the greatest effect overall. Thus, the hypothesis was not supported, and the null hypothesis was rejected.

PROJ# T 2

NAME: Jeffery Ginther

Hanna Lee, Joel Sampson

GRADE: 12

GENDER: male

SCHOOL: Heritage Christian School

PROJECT TITLE: Stayin' Alive: Can Exhaustion Kill?

ABSTRACT:

The purpose of this project is to design and create a device which can make administration of CPR “fool proof,” as well as reduce the exertion that the rescuer uses upon the victim. Proper CPR chest compressions require an awkward and uncomfortable hand position. Our device makes the hand position more comfortable.

The device is primarily made of a wooden frame, springs, and a pressure sensor. When one exerts a downward force upon the device, the springs compress, and at a designated pressure, the device beeps, which lets the user know they have applied enough pressure. The testing of the device consisted of four trials by individuals. They gave compressions for three minute periods, alternating use of the device with each trial. Sufficient time was given to the individuals between trials to recover. Exertion was measured by the heart rate. We used a pulsoximeter to get a constant reading of the heart rate. We hypothesized that the device would decrease the effort exerted, because the awkward hand position of traditional CPR compressions required use of muscles which are not as commonly used.

Upon completion of their trials, the test subjects commented upon the increased comfort of the device. The average change in pulse rate as a percentage of the baseline with the device was 28% lower than without the device. This led us to believe that less effort was needed to administer CPR compressions using the device

PROJ# T 3

NAME: Justin Martin

Stephen Esposito

GRADE: 11

GENDER: M

SCHOOL: Greensburg High School

PROJECT TITLE: Effect of Sleep Deprivation on Fruit Fly Mating Habits

ABSTRACT:

The purpose of this science fair experiment was to discover any change in the mating habits of fruit flies after sleep deprivation. During this procedure we kept a colony of Drosophila melanogaster awake for a period of 8 hours by keeping them on a gently rolling platform while simultaneously letting a colony of fruit flies sleep normally. Both colonies had the same media (food) and lighting circumstances. After the 8 hours was up, we transported each colony to a freezer until the became still. This allowed for us to correctly identify each fruit fly as either male or female. We then isolated 20 pairs of fruit flies, on pair at a time, in a petri dish and observed their mating tendencies. This step was done for both the sleep deprived fruit flies as well as the well rested fruit flies. We observed that only 3/20 pairs of the sleep deprived flies successfully mated and that 13/20 pairs of the well rested flies mated. Scientists sill cannot explain the importance of sleep deprivation. Sleep deprivation can effect mental, emotional, and social aspects of life, but until the purpose of sleep is discovered, humans will still have to get their sleep in order to stay well-rounded beings.

PROJ# T 4

NAME: Haley Tisdale

Katie Shew

GRADE: 11

GENDER: Female

SCHOOL: Terre Haute North Vigo High School

PROJECT TITLE: Comparison of Power: Sprint vs. Distance

ABSTRACT:

The object of this experiment was to observe whether or not the force of an athlete's jump affects his or her athletic performance. Our hypothesis was that there is a correlation between the force to weight ratio and a swimmer's ability to compete as a sprint or distance swimmer. In order to conduct this experiment, numerous swimmers were asked to swim a 50-yard and 400-yard freestyle for time so they could be classified into either the sprint group or the distance group. Next, the swimmers performed their jumps on the digital force sensor and the results were collected as data. The swimmers were studied throughout the winter swimming season. Their times at the beginning of the season and the end of the season for their best event(s) were recorded. The times were compared and the swimmers were re-categorized into the two groups once again. The swimmers performed their jumps on the digital force sensor for a second time and the data recorded. These results for the after-season were compared to the pre-season results to discover whether or not the hypothesis was correct.

PROJ# T 5

NAME: Caroline Trippel

Caitlyn Elizabeth Koscielski

GRADE: 12

GENDER: Female

SCHOOL: Marian High School

PROJECT TITLE: Can Mass Spectra be Obtained Directly from a TLC Separation of Lipids from Mycobacterium avium?

ABSTRACT:

Tuberculosis (TB), a disease which afflicts millions of people, is caused by the organism Mycobacterium tuberculosis (M. tuberculosis). However, when studying the disease, the benign compound, Mycobacterium avium (M. avium), a member of the class of organisms that includes M. tuberculosis, is often used as a safer alternative. Studies have shown that the molecules located on the surface of M. avium, called glycopeptidolipids (GPLs), cause it to be recognized by a host immune system. These GPLs can be extracted and purified to determine their chemical structures. In a recent study, this process included the following time consuming steps: extraction of total lipids, separation of GPLs from this total lipid fraction using thin layer chromatography (TLC), removal of GPL bands from the TLC plate, and finally, chemical characterization by mass spectrometry. The purpose of this project is to determine if it is possible to use Imaging Mass Spectrometry to characterize directly the GPLs from the TLC surface. Imaging Mass Spectrometry can be performed using the technique of matrix assisted laser desorption ionization (MALDI). MALDI produces gas phase ions by using laser light energy to desorb material from a sample surface coated with a matrix compound. Therefore, it should be possible to add a thin coating of matrix directly to a TLC plate which contains separated GPLs. The resultant GPL ions can be detected by a time-of-flight mass spectrometer. The goal of this experiment is to determine if a reliable and reproducible method can be developed to obtain mass spectra of GPLs from a total lipid separation directly off the surface of a TLC plate.

PROJ# T 6

NAME: Harvet Jones

Michael Higgins

GRADE: 11

GENDER: Male

SCHOOL: Lew Wallace High School

PROJECT TITLE: Wii VS Exercise; How dose it affect Blood Pressure

ABSTRACT:

The purpose of our project is to determine which will get your heart beating faster, exercising using the Nintendo Wii gaming system or going out and actually doing the exercises it attempts to emulate. Our hypothesis is that exercise will increase you vital statistics more than playing the Wii game. To help us find the answer to this question we first had to gather 20 students. After doing so we tested their heart rates prior to doing any physical activity. Next we had them each play the Nintendo Wii for 3 minutes. The game we chose for them to play was Wii Sports Boxing. Using a pc application called Logger lite and a Vernier heart rate and blood pressure probe, we were able to acquire each participant's heart rate and Pressure. After taking everyone's heat rate, systolic and diastolic pressure, and their mean arterial pressure, we had them exercise for three to ten minutes. Since boxing requires a lot of movement on your feet, we decided to have them run for three to ten minutes as an equivalent to the time playing the game. After the exercising we tested their heart rates for the third time. Finally after all the testing, we discovered that playing the Wii game did increase the heart rate slightly while lowering the blood pressure, while running increase both the heart rate and the blood pressure extremely more that just playing the game.