CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)

Ronit B. Abramson

Project Number

S1501

Project Title

Use of Epilithic Diatoms as Biological Indicators of Pharmaceutical Runoff

Abstract

Objectives/Goals

This research is intended to study possible relationships between the diversity of diatoms and the concentration of acetaminophen present in their aquatic environment. The purpose of this work is to determine the potential for epilithic diatoms as biological indicators of pharmaceuticals in water.

Methods/Materials

The effects of acetaminophen on the diversity of diatoms was studied by creating microcosms to simulate the presence of the drug in a slow moving stream containing epilithic diatoms. Concentrations of acetaminophen were introduced into the systems in four ratios of part acetaminophen to part water: one to one hundred thousand, one to ten thousand, zero (control), and one to one thousand. Samples of the diatoms grown in these microcosms were then taken and made into slides from which a three-hundred cell count was conducted and the populations of each species within the three-hundred count was calculated.

Results

In this experiment, amphora and navicula species demonstrated direct concentration-diversity relationships, meaning their populations increased within the three hundred individual cell count as the concentrations of acetaminophen increased, while the nitzschia demonstrated an indirect relationship.

Conclusions/Discussion

Slight concentration-diversity correlations were found for several of the assessed species of diatoms in colonies exposed to acetaminophen in the aquatic microcosms. Navicula, nitzschia, and amphora exhibited related changes in population based on acetaminophen concentrations. Pharmaceutical runoff is commonly dismissed as insignificant and ineffectual to organisms; however, this research refutes that and suggests diatoms as effective indicators of pharmaceutical runoff. The use of diatoms as biological indicators would allow for more accessible and effective detection of pharmaceuticals in bodies of water. These indicators would allow for wider testing and treatment of water sources, protecting ecosystems and organisms from indefinite and dangerous pharmacological effects.

Summary Statement

A study of the effects of acetaminophen on diatom species diversity and the possible uses of diatoms as biological indicators of pharmaceuticals runoff.

Help Received

Used lab equipment under the supervision of Ms. Wendy Slijk, Life Sciences and Biology Teacher, Department Head of Science at Canyon Crest Academy; Mr. Mark Schmid and Mr. Joel Abramson assisted in the construction of the microcosms

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Deena R. Abuyounes

Project Number
S1502

Project Title
The Effects of Klinefelter's Syndrome on the Social Approach Behaviors in Mice: Year 2

Abstract

Objectives/Goals
The XXY chromosome arrangement is the most common sex chromosome aneuploidy in humans and occurs as frequently as 1 in 500 to 1 in 1,000 male births. Many studies have been performed to find causes of KS, but not very many have been conducted on the social behaviors caused by Klinefelter#s Syndrome. An experimental XXY mouse model which exhibits symptoms close to human KS has been developed to use in experiments. The experiment would observe social interactions and gender preferences in XXY mice and may lead to further findings in this field.

Methods/Materials
Fourteen adult XY and XXY male mice were studied and video recorded. An apparatus of three equal chambers was assembled. The test mouse could choose to enter any of the three chambers. Each testing took place in three 3-10 minute stages. For each of the three types of recordings, the first timed segment was a habituation process. In the second timed segment, either a stranger mouse was introduced to the left chamber and a stranger mouse, of opposite gender, to the right (from camera#s perspective), or different male and female odors were introduced. In the last timed segment, either a stranger object replaced the stranger mouse on the left, or a different odor was introduced. Two observers blind to the karyotypes of the test mice observed the tapes and recorded the number of entries into each chamber, the time spent in each chamber, and the sniffing of each stranger object.

Results
XXY mice compared with XY mice spent more time initially in the chamber containing a male mouse but subsequently spent less time in the chamber that contained the female mouse. In addition, the XXY mice spent more time in the chamber containing a male mouse odor than a female mouse odor. The XXY mice also exhibited significantly reduced sniffing behavior to the stranger object. After testosterone implantation, the differences between the behaviors of the XXY mice and XY mice were greatly reduced.

Conclusions/Discussion
The social interactions of XXY mice with stranger mice are affected by the latter#s gender (a difference not seen in XY mice). This data suggest a role for the X chromosome, or X-inactivation, in gender preference. In addition, testosterone has a large affect on the behaviors displayed in the XXY mice.

Summary Statement
This project focuses on the effects of testosterone on the social behaviors of mice with Klinefelter's Syndrome.

Help Received
Used lab equipment and animal subjects at UCLA Harbor/ LA BioMed endocrinology lab under the supervision of Dr. Yan He Lue

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Alvin B. Aguelo

Project Number
S1503

Project Title
Effect of Antifouling Paint on the Fertilization Rate of Strongylocentrotus purpuratus

Abstract

Objectives/Goals
Rather than documenting the effect of antifouling paints on mature organisms, the impact on the gametes of the organism S. purpuratus was examined by analyzing the relationship between the fertilization success rate (%) and the presence of antifouling paints.

Methods/Materials
Various surface areas of PVC pipes were coated with IFB (with Irgarol) and HRC Rust Preventer and were exposed to seawater for varying time periods. The gametes from the purple seaurchin were collected and were added to the water samples in Petri dishes for period of 15 minutes, and then slides were prepared and observed to determine the success rate for a period of 15 minutes. Then, slides were observed to determine the fertilization rate for each surface area/volume ratios.

Results
The experimental results indicated a substantial decrease in the fertilization success rate of the antifouling paint IFB (with Irgarol) and further decline with HRC Rust Preventer.

Conclusions/Discussion
The data indicated that the success rate for the control group was between 70-75% which dropped drastically after the gametes were introduced to various surface area/volume ratios. Furthermore, statistical comparisons between groups exposed to different time periods showed mixed results. However, the stastistical analysis between the two different types of paint had no significant difference. These results indicate that the addition of the Rust Preventer has no significant influence on the fertilization of the urchins.

Summary Statement
Experimental investigation on the effects of antifouling paint on fertilization success rate of the Strongylocentrotus purpuratus (purple sea urchin).

Help Received
Mount Miguel Laboratory equipments used under the supervision of Mr. Linke; Mr. Linke helped explain statistics; Friend, Brandon Bilyeu helped in locating urchins; Parents assisting me to the tide pools; Mr. Larry Nordell for the letter response regarding the safety precautions for urchins

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Wenelia Baghoomian

Project Number
S1504

Project Title
The Effect of O.T.C Drugs on Daphnia

Abstract

Objectives/Goals
When humans and livestocks excrete drugs, it enters the sewers and into our streams, affecting the creatures living underwater. The objective of this project is to determine what the effect of O.T.C drugs are on Daphnia.

Methods/Materials
Materials used in this project include 1 gallon dilluted water, pipettes, 50 Daphnia, 1 bifocal compound microscope, teaspoon, timer, plates, cups, cover slips, and slides. I hypothesize that as the pH level of the drug decreased, the heartbeat of the Daphnia would increase. To test this out, I added over the counter drugs (Naproxen, Acetaminophen, Aspirin, and Ibuprofen) to a group of Daphnia. I also added a combination of drugs to another group of Daphnia to recreate a similar affect one might find in a pond or stream. Using the microscope and timer, I recorded the heart-beats per minute of the Daphnia.

Results
Daphnia#s normal heartbeat being 182 per minute, all four of the drugs had a similar effect on the Daphnia#s heart rate; the drugs, all suppressants, speed up the heartbeat rate, being between 4% and 31%. Aspirin (C), increased the heart beat rate of 31%, had the strongest effect on the Daphnia, and Naproxen (A), increased the heart bate of 4.7%, had the least effect on the Daphnia. Ibuprofen (D) and Acetaminophen (B), respectively, increased 11.3% and 22.2%.

Conclusions/Discussion
The results prove that over the counter drugs have an immediate effect on Daphnia. If the drugs were to enter the wild, which they do, the Daphnia population would be poisoned, and eventually die off; the Daphnia#s heart rate will rise when exposed to acidic drugs and too much exposure can leave the female Daphnia to infertility. Looking at a larger scale, this test was just conducted on over the counter drugs on a small sample of Daphnia. However, the fact remains that millions of different drugs enter the water each day- ranging from harmless vitamins to deadly cancer fighting drugs to anesthetics- and affect a variety of marine biology. So if one "harmless" over the counter drugs can speed up the heart beat of a Daphnia by 31%, imagine what is happening today as millions of deadly drugs are pouring into our streams and lakes, and affecting the creatures living there.

Summary Statement
The use of pharmaceuticals by both humans and livestocks contaminate and poison animals, lakes and streams.

Help Received
Mother and father bought Daphnia and microscope

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Lacey A. Benefiel

Project Number
S1505

Project Title
The Effects of Lethal Concentrations of Environmentally Friendly Capsicum frutescens Pesticides on Acheta domesticus

Abstract

Objectives/Goals
My purpose was to find a type of pepper and a concentration level that would not only be successful, but would also not harm the environment. I am trying to find an environmentally friendly pesticide because there are many factors in a chemical pesticide that can be harmful to both the environment and the organisms that live in it. This is a 3rd year continuation of my previous projects.
After performing the experiment, I statistically analyized my data so that I knew whether or not my collected data was valid. Then, I was able to determine which pepper was still lethal but could be produced as a pesticide most cost effectively by using the lowest concentration. I also determined whether there was a difference in the mortality rates between the 3 peppers.

Methods/Materials
First I liquified the 3 peppers (chile pequi, chile de arbol & chipotle) so I could spray them like a pesticide. I tested the peppers using a total of 50 crickets per concentration level. After spraying the pesticide on the crickets, I observed how many died every 15 minutes until an hour was up. I started out at full concentration for each pepper and reduced the concentrations by half until the pesticide was no longer lethal.

Results
After looking over my results I got from my 3 peppers at different concentration levels, I found that chile de arbol was very lethal, even at a low concentration. Chile pequin was almost as lethal as chile de arbol, but could only go down to 1/2 the concentration to be as effective as the full amount. The canned chipolte was the weakest out of the 3 peppers.

Conclusions/Discussion
After conducting my experiment this year, I was able to come up with a sufficient amount of data to be statistically analyzed. The two statistical tests a professor from CSUF helped me run on my data was the Two-Way ANOVA test and the Student-Newman-Keuls (S-N-K) test. The conclusions I drew from the ANOVA test was that my data had too much of a pattern to be caused by chance. After I ran the S-N-K test, I found that by using either chile pequin or chile de arbol at 1/2 concentration would be just as effective and less costly to produce. I am currently running another statistical test to find the rate of kill for each pepper as well as analyzing and comparing the different peppers at the different concentration levels.

Summary Statement
I am finding an environmentally friendly pesticide by testing three separate peppers: chile pequin, chile de arbol, and chipotle, and finding a concentration that is as effective as the full concentration.

Help Received
Mother assisted with layout of the board; Father helped by buying materials; teacher and science advisor allowed me to run experiment in his room; former professor at CSU Fresno helped with statistical analysis.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Laura J. Botzong

Project Number
S1506

Project Title
How Does Nitrate and/or Phosphate Pollution Affect the Survivorship of Purple Sea Urchin Larvae?

Abstract

Objectives/Goals
The purpose of this experiment was to determine how nitrate pollution and phosphate pollution affect the survivorship of purple sea urchin larvae. It was hypothesized that a mixture of nitrates and phosphates would positively affect the survivorship of purple sea urchins. Since the algae on which the larvae feed thrive in conditions with high nutrient levels, conditions with more nutrient pollution will be beneficial to the larvae.

Methods/Materials
In order to test this, purple sea urchin larvae were raised in four tanks: a control tank, a tank with added nitrates, a tank with added phosphates, and a tank with both nitrates and phosphates added. The number of larvae in each tank was counted after 28 and 32 days.

Results
The data did not support the hypothesis, as the control tank had the highest number of larvae, followed by the nitrate tank. All the larvae in the phosphate and nitrate-phosphate tanks perished before the data collections were performed.

Conclusions/Discussion
In conclusion, phosphates and nitrates at the levels tested are detrimental to the survival of purple sea urchin larvae, with phosphates having a stronger negative effect than nitrates. Evidently, the negative effects of the nitrate and phosphate pollutant chemicals on larval development outweighed any additional algae growth they may have caused.

Summary Statement
This research investigates a possible correlation between nutrient pollution and purple sea urchin survival.

Help Received
Mentor Kiersten Darrow; aquarists Ben Higgins, Andres Carrillo, Cora Webber; used lab equipment at Cabrillo Marine Aquarium's Aquatic Nursery; high school teachers Ms. Wood and Mrs. Moeller

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Debra C. Chang

Project Number
S1507

Project Title
Reduction of Bioluminescence in Cypridina hilgendorfii by Varying Phosphate Concentrations

Abstract

Objectives/Goals
The purpose of this study was to determine the effect of varying phosphate concentrations on the bioluminescence from a marine shrimp, Cypridina hilgendorfii (also Vargula hilgendorfii, sea firefly, or Japanese ostracod). This project targets the chemical reaction of luciferin and luciferase, the reactants that produces light.

Methods/Materials
Dried and powdered Cypridina was introduced in water solution of trisodium phosphate dodecahydrate in 0.005 g/mL, 0.01 g/mL and 0.015 g/mL. The control group was pure distilled water with no phosphate. Two mL of the phosphate solution and 0.05 g of ground Cyrpidina were placed in a cuvette. Four trials were done per concentration for a total of 16 trials. Photographs were taken during this entire procedure in a darkoom using a digital camera at exposures of 8, 10 and 15 seconds.

Results
Various attempts to accurately quantify the amount of light transmitted, such as using a sensitive light meter, did not yield usable results due to the source¡#s dimness. It became necessary to quantify the emitted light by establishing a standard of brightness scale. The standard was determined by choosing the average brightness from the four untreated cuvettes in the control group. The results were determined by using the number of seconds of exposure needed to reach the light intensity of the standard.

Conclusions/Discussion
With increasing dosage, the time observed to reach standard brightness increased. Numerical analysis suggests that there is a simple, direct ratio between the amount of light emitted and time elapsed after initial mixing of the solution. A similar relationship appears to exist between dosage and amount of light transmitted. With the significant diminishment of light caused by the sodium phosphate, this study suggests that Cypridina can be used as a bio-indicator for phosphate pollution and possibly water quality in general.

Summary Statement
This project examines the effect of phosphate, a common water pollutant, in varying concentrations on the bioluminescence of Cypridina hilgendorfii by targeting the reaction that produces light.

Help Received
Thanks to: Dr. Hoffmann, professor at UCI, for answering my questions for my project; Robert Carr and Tracy Drake for allowing me to work at Madrona Marsh; Mr. Fogle, the photography teacher at Palos Verdes Peninsula High School, for letting me use the darkroom.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)

Hyea Ryung Cho

Project Number

S1508

Project Title

Alloprenanolone: Neurogenic Property and Therapeutic Potential in AD Treatment

Abstract

Objectives/Goals

Objectives: We investigated whether APa promotes generation of new neurons in vivo by peripheral administration in transgenic 3xTgAD and non-Tg mouse AD models; and whether GABAA receptor complex (GBRC) is involved in the neurogenic activity of APa in hNPCs.

Methods/Materials

Methods: The newly-formed cells were labeled by BrdU and the samples were evaluated by stereological analyses in the subgranular zone (SGZ) of dentate gyrus. Neurogenic abilities of APa and its analogs in hNPCS are determined by BrdU incorporation. Expression of GBRC subunits in hNPCs were determined by RT-PCR and immunocytochemistry.

Results

Results: Stereological analyses demonstrated that the basal level of BrdU labeled cells in the dentate gyrus of 3xTgAD mouse was lower than that of non-Tg mice. APa induced a significant increase of newly-formed cells in SGZ of both non-Tg and 3xTgAD mouse. APa restored SGZ proliferation to that of control non-Tg mice. Immunochemical labeling demonstrated the expression of GABAergic system in hNPCs and RT-PCR detection demonstrated the expression of alpha 1/5, beta 2 and delta subunits. Steroid specificity assay demonstrated the involvement of GBRC and structural specificity.

Conclusions/Discussion

Conclusions: In vivo, APa rescues the neurogenic impairment of 3xTgAD mouse and enhances the proliferative capacity of both the non-Tg and transgenic phenotypes. Results suggest that APa may be an effective neurogenic therapeutic to promote neurogenesis prior to the onset of AD pathology.

Summary Statement

The effects of neurosteroid Allopregnanolone has positive results with cell proliferation in brain.

Help Received

Mentor: Lifei Liu, PI: Dr. Roberta Diaz Brinton, USC School of Pharmacy

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Jeremy E. Creighton

Project Number
S1509

Project Title
Does Topical Application of the Rubefacient C. frutescens Increase Thermogenesis?

Abstract

Objectives/Goals
To determine if cayenne (capsicum frutescens) increases temperature of the feet with topical application. When A person 'feels hot' in a specific area, is their temperature really affected?

Methods/Materials
I selected nine healthy subjects to be tested. The bare footed subjects were seated on a bench. Body and foot temperatures were recorded along with room temperature. Subjects put one of their feet in the 80 degree cayenne-water and the other foot in the 80 degree control water. After five minutes temperatures were recorded (every 5 minutes) for the next 30 minutes including room, body, and water temperature. In the next phase, feet were taken out of the water, dried off, and socks were put on. After 5 minutes, temperatures were taken every 5 minutes for 20 minutes.

Results
While in water, cayenne foot had a 2 degree average increase in thermogenesis compared to control. After wearing the sock the cayenne foot continued to keep itself warmer than the control foot by an average 1.1 degrees. Cayenne also increases body temperature by 1.5 degrees, while the foot was in the water; and by 0.9 degrees wearing the sock.

Conclusions/Discussion
Based on my tests, I can conclude that the topical application of the rubefacient Capsicum Frutescens will increase thermogenesis of the foot. I based my conclusion on the cayenne's ability to increase thermogenesis according to how many degrees higher the cayenne foot was than the control. The #Hot# feeling is more than a sensation. Many of the subjects had an increase in thermogenesis before they noticed a sensation.

Capsicum is the active stimulating ingredient in this rubefacient. I have seen how it draws blood to the skins surface upon application, making the skin red. Cayenne increases blood flow by thinning the blood and expanding the capillaries. The hot substance, capsicum is a natural oleoresin belonging to a group called capsaicinoids. The capsaicinoids open cell membranes in a manner which allows calcium ions to flood into cells causing a sensation to be felt.

To give further support to my conclusion, additional experiments were done on feet out of water after a sensation was felt (6 hrs.) The cayenne foot temp. increased 8 degrees. I also did a few tests on the tongue and ear. I found applying cayenne to the ear gave immediate results:a 12 degree increase in temp.

Summary Statement
Topical application of the rubefacient Capsicum Frutescens increases thermogenesis of the foot through capillary dilation and increased circulation by a maximum of 2 degrees; and has a greater effect if tested on a sensitive location.

Help Received
Thanks fo my sister Audrey for her suggestions on this project. Thank you to Charlotte Creighton my Master Herbalist consultant.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Lauren Dansey; Stephanie Leung

Project Number
S1511

Project Title
Power Plants

Abstract

Objectives/Goals
The original information that began the interest in radiated seeds was the discovery that seed companies often radiated their seeds to kill microorganisms that could be harmful to seed germination. From this information, we wanted to know what effects radiation has on seed development.

Methods/Materials
We hypothesized that as exposure to microwave radiation on seeds increased the germination rate of seeds would decrease. To test this hypothesis we had four seed types- watermelon, cantaloupe, bean, and pea. Each plant type had 6 groups with 6 seeds in each group. Each group was separated by microwave radiation exposure. The time increments were control (0 seconds), 5 seconds, 10 seconds, 15 seconds, 20 seconds, and 25 seconds. The radiated seeds were then planted and observed for 28 days.

Results
The results showed that the 10 second group grew the most, and the 20 second group had the second highest height average.
The experiment proved that our hypothesis was correct and incorrect. While the 10 and 15 second groups grew the most, beyond 15 seconds, plant height decreased.

Conclusions/Discussion
We concluded from these results that a certain amount of radiation can, in fact, assist plant growth. After further discussion, we concluded that just as radiation can inhibit microorganism growth, it can also act as a kind of catalyst. The radiation from the microwave weaken some seed coat bonds making it possible for seeds to germinate faster as they can break through the seed coat easier. But too much radiation breaks the bonds and so hurts the seed which is why the 20 and 25 second groups had a decrease in average height. Furthermore, the bean and pea seeds reacted better to the radiation as their seed coats are not as thick and hard as the watermelon and cantaloupe seed coats. The radiation could more easily weaken the pea and bean seed coats and they were able to grow quicker and taller.
While too much radiation can hurt weak seed coats, a certain amount of radiation can actually help seeds by giving a jump start to germination.

Summary Statement
We wanted to know whether microwave radiation would harm seed germination or benefit seed germination.

Help Received
none

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Kris M. Evered

Project Number
S1512

Project Title
Does Ascorbic Acid Reduce Salt Stress in Lactuca sativa Plants?

Abstract

Objectives/Goals
This experiment is to test if various concentrations of ascorbic acid (Asc) will reduce salt stress in Lactuca Sativa Capitata plants that are exposed to various dilutions of salt (NaCl). Because vitamin C (Asc) acts as an antioxidant, I hypothesize that it will reduce the oxidizing effects of salt stress in these plants.

Methods/Materials
Ninety Lactuca Sativa Capitata plants were exposed to 500ml of H20 alone and in combination with differing dilutions of NaCl (0.2922g and 1.461g) and Asc (0.0495g and 0.0099g). The results of the exposure were recorded over a 15 day period. Observations were made daily of each plant's health. The characteristics of plant color, leaf integrity, and insect infestation were evaluated and recorded according to a designed scale. Averages and standard deviation values for each observation were computed and analyzed.

Results
An unexpected white fly infestation changed this experiment. The results were influenced by two stresses on the plants, abiotic (salt stress) and biotic (insect stress). The insect stress most detrimentally affected the control group. The ascorbic acid alone and with the lowest levels of NaCl faired the best for the salt stressed groups., displaying less color change and more leaf integrity despite high insect infestation. On the other hand, the greatest amount of NaCl combined with the lesser amount of ascorbic acid had the highest rate of morbidity with the mean reaching 3.5 in color and leaf integrity. The salt stressed plants without ascorbic acid did not die, as expected. Their salt stress response seemed to help them combat the insect infestation which killed the control group.

Conclusions/Discussion
Asc in both concentrations helped the plants under salt stress. When the plants were exposed to the highest levels of NaCl, the lowest levels of Asc were not beneficial; the highest level of Asc worked better. When plants were exposed to lower levels of NaCl, both levels of Asc were beneficial. In dealing with the biotic stress of the whitefly, both Asc and NaCl functioned to allow the plants greater resistance to the effects of insect infestation. The response to salt stress alone created internal responses that helped battle the whitefly stress.

Summary Statement
This experiment examined if different concentrations of ascorbic acid (Asc) would reduce the salt stress in Lactuca Sativa Capitata plants that were exposed to various dilutions of salt (NaCl) and insect infestation.

Help Received
Mother helped set up project. I used lab equipment at UC Riverside under the supervision of Dr. Julia Serres. Father helped with graphing results.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Sasha A.C. Foo

Project Number
S1513

Project Title
The Effects of Melatonin on the Cumulative Sleep Time and the Inception of Sleep of Drosophila melanogaster

Abstract

Objectives/Goals
My project helps gain insight into the triggers of the genetic sleep cycle, melatonin being a possible trigger. My hypothesis is the melatonin will shift the sleep cycle of flies so that they wake up earlier and sleep longer. Furthermore if 0.0015g of melatonin is added to the food source of each fly culture, the cumulative sleeping time will be twenty minutes longer than the control, and the inception of sleep will occur thirty minutes earlier than the control. Also if 0.003g of melatoni was added, cumulative sleeping time will be thirty minutes longer than the control, and theinception of sleep will ooccur forty minutes before the control.

Methods/Materials
1. Make homemade fly cultures out of a plastic vial and foam. 2. Divide Drosophila medium into thirds. Two-thirds will be used with melatonin. 3. Weigh melatonin capsules and measure 0.003 and 0.0015g. 4. Use mortar and pestle to ground 0.003 into a fine powder. 5. Add 0.0015 g of melatonin to the amount of water needed for one culture. 6. Stir thouroughly. 7. Put Drosophila medium in cultures. 8. Add water and melatonin solution to Drosophila medium. There are equal amounts of water and medium. 9. Let set for one minute. 10. Repeat but with 0.0015 g. 11. Repeat again for the control. Skip steps six and seven. 12. Divide flies into three groups of seven. 13. Put the fly culture in the freezer on its side for thirty minutes. 14. Get ice pack. 15. Tap seven flies into the Petri dish. 16. Pick them up using the brush and place them in the new culture. 17. Repeat two times. Use ice pack to keep. 18. Set up video equipment. 19. Videotape each culture's activities. 20. Watch tapes and record the time of the initiation of sleep and total hours slept. 21. Repeat.

Results
I found that the general hypothesis was right. The fruit flies did fall asleep earlier and sleep longer. However the results of the dosage were wrong. The 0.0015g flies fell asleep forty-foor minutes before the control and slept fourty-nine minutes longer. The 0.003f flies fell asleep and hour and five minutes before the control and slept and hour and six minutes longer than the control. My T-Test results yielded a result in all occasions that $p<0.001$.

Conclusions/Discussion
My data does not prove that melatonin triggers the genetic sleep cycle. It does strongly support that theory. Also, it proves that melatonin and the genetic sleep cycle are directly related.

Summary Statement
My project focuses on the effects of melatonin on the sleep cycle of Drosophila .

Help Received
Two teachers helped me set up the VCR used in the experiment.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Logan C. Hubbard

Project Number
S1514

Project Title
The Effects of Beta and Gamma Radiation on Chitinous Organisms

Abstract

Objectives/Goals
This project is going to test what, if anything shields a cockroach and gives it its relative immunity to radiation. This will be measured by the Geiger- Muller Tube, on a stand at 4 cm with a lead plate as a reference shield. Various parts of the cockroaches will be placed between the shield and the radioactive source and the results will be measured by the counter. The readings will then be compared to the initial reading of the lead and see if there is a decrease in the radiation. This data was then compiled graphically, and from this conclusions will be drawn as to the reason why cockroaches are more impervious to radiation than humans.

Methods/Materials
Geiger-Muller Counter
Geiger Probe
Various Radioactive Samples
Spectroscope
Radiation Shields of varying density
Laptop
USB cables for laptop
Software for computer interface
Meter Stand
Radiation sample holding box
3 Hissing Cockroaches

Results
The radiation was decreased when the different parts of the cockroach were added in unison with the lead plate.

Conclusions/Discussion
From the data presented throughout the experiment one can clearly see that as the intact cockroaches, and the shells of the cockroaches are added in conjunct with the lead shield, the counts per minute decrease. The first graph shows the decreasing counts per minute of the different sources comprehensively, while the consequent three show the show the decrease of the different parts of the cockroach with respect to the lead plate on an individual basis. These results effectively show that in the event of a nuclear explosion, cockroaches would be best equipped to survive the consequent fallout.

Summary Statement
How radiation effects different parts of cockraoches and other chitinous organisms.

Help Received
Used the Ribet Academy Biology Lab

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Otana A. Jakpor

Project Number
S1515

Project Title
Indoor Air Pollution: The Pulmonary Effects of Ozone-Generating Air Purifiers

Abstract

Objectives/Goals
Although air purifiers are advertised to improve breathing, some air purifiers emit harmful ozone. Approximately 10% of California households own an air purifier that may produce ozone. The purpose of this research is to clarify the pulmonary effects of ozone-generating air purifiers, to determine whether they are helpful or harmful for breathing.

Methods/Materials
Experiment #1: An ozone sensor was used to measure the concentration of ozone at various distances from three ionizing room air purifiers, a personal air purifier, and an ionic pet hair brush.
Experiment #2: Spirometry and pulse oximetry was performed on 24 subjects before and after a 2-hour exposure to an ionizing room air purifier.
Experiment #3: Spirometry and pulse oximetry was performed on 10 subjects before and after a 3-hour exposure to a personal air purifier which hangs around the neck.

Results
Experiment #1: Some of the ionizing air purifiers tested produced ozone in levels higher than a Stage 3 smog alert.
Experiment #2: A 2-hour exposure to an ozone-generating room air purifier reduced an important measure of pulmonary function (FEV1/FVC) among the asthmatics tested.
Experiment #3: A three-hour exposure to a personal air purifier caused a statistically significant reduction in pulmonary function among both the whole study population as well as the asthmatic subset ($p<0.05$).

Conclusions/Discussion
The ionizing air purifiers I tested produced ozone and had a negative effect on an important measure of pulmonary function (FEV1/FVC).

Summary Statement
This research demonstrates that certain ozone-generating air purifiers have a negative effect on an important measure of pulmonary function.

Help Received
I would like to thank my mother Karen Jakpor, an asthmatic, for lending me her pulse oximeter and her microspirometer, and for teaching me how to use them. In addition, I would like to thank her for her editorial assistance. I also wish to thank Eco Sensors, Inc. for donating an ozone monitor for my research.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Ryan Ko

Project Number
S1516

Project Title
Repeated Injection Exposures to Naphthalene Produce Terminal Bronchiolar Clara Cell Tolerance in Female Mice

Abstract

Objectives/Goals
Lung cells in male mice can develop a "tolerance," or resistance, against naphthalene, a common toxic pollutant, after repeated injections. This experiment aimed to determine whether tolerance can be induced in female mice.

Methods/Materials
Three groups of five female mice were used: group one was injected with seven daily doses of naphthalene (200 mg per kg body weight), group two received the same treatment as group one plus an additional challenge dose (300 mg per kg body weight) on the eighth day, and the control group received seven daily doses of corn oil (200 mg per kg body weight). Mice lung cross-sections were imaged under light microscopy and counts of nonciliated, ciliated, and vacuolated cells were tabulated. Stereological techniques were used to calculate bronchiolar epithelium thickness, volume fraction, and volume per surface area of the three cell types.

Results
An ANOVA statistical test was run, and no statistically significant difference of the parameters measured was found between treated and non-treated cells. However, treated mice showed more areas of hyperplasia than controls.

Conclusions/Discussion
Repeated injection exposures of naphthalene produced no observable difference in terminal bronchiolar Clara cells of female mice studied. Future research would involve repetition of the study, as well as studying different airways, method of dosage (inhalation vs. injection), and finding the mechanism of tolerance in female mice.

Summary Statement
Stereological techniques and statistical analysis of mice terminal bronchiole cross-sections were used to determine that tolerance to the common chemical naphthalene can be induced in lung cells of female mice.

Help Received
Participaed in UC Davis Young Scholars Program in Dr. Laura Van Winkle's lab. Received terminal bronchiole slides from Dr. Van Winkle (mice were originally used for another experiment). Used lab microscope and software, as well as university library resources for literature research.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Jessica Y. Kwan

Project Number
S1517

Project Title
Determination of the Ideal Concentration of Hydrogen Peroxide Solution for the Growth of Flowering Plants

Abstract

Objectives/Goals
The objective of this research was to determine which concentration of hydrogen peroxide (H(2)O(2)) solution would be optimal for the maximum growth of a plant.

Methods/Materials
Five flowering viola plants and five flowering impatien plants were purchased and repotted into separate flower pots containing a general potting soil which had no added fertilizers. The violas and impatiens were separated into two different groups, and each pot was labeled according to the percentage of H(2)O(2) solution that the plant would receive. Every other day, for two weeks, each plant was watered with 40 mL with its respected concentration of H(2)O(2), and the height and length of each plant was recorded. The four different percentages of H(2)O(2) solutions (1.5%, 3%, 4.5%, 6%) were diluted, using tap water, from a 30% hydrogen peroxide solution before watering the plants. Seven recordings of each plant were taken by the end of this experiment.

Results
Overall, the flowering plants which were watered with the 1.5% concentration of H(2)O(2) grew the tallest and longest. The growth of the flowering plants watered with 3% H(2)O(2) did not support the hypothesis because the plants did not reach optimal height or length growth. The growth of plants watered with 4.5% and 6% H(2)O(2)solutions declined until the plants had wilted. The control group, which was not watered with any concentration of H(2)O(2), grew at a steady rate, but did not grow as tall or long as the plants in 1.5% H(2)O(2) solution.

Conclusions/Discussion
Through the experimentation, it was determined that the usage of hydrogen peroxide generally led to an increase in plant growth depending on the concentration of the solution. At a low concentration of 1.5%, the growth of the plant was enhanced, while at a high concentration of 4.5% and 6%, the growth of the plant was stunted. The 3% concentration of H(2)O(2), which is marketed by the horticultural industry, initially helped the plant to grow, and then caused the plant to wilt. This data suggests that the decomposition of H(2)O(2) solution within the soil of the plant directly affects the growth of plants, and depending on how dilute or concentrated the solution of H(2)O(2), the solution can be beneficial for plants.

Summary Statement
The purpose of this project was to determine whether or not the varying concentrations of hydrogen peroxide solution would aid the growth of a plant.

Help Received
Mr. Starodub helped with science fair preparation, Father helped educate on the properties of H(2)O(2), Mother helped with education of botany, Twin sister helped with dilutions of H(2)O(2) solution

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Ian C. Peggs

Project Number
S1518

Project Title
Effects of Energy Drinks on Blood Sugar Levels

Abstract

Objectives/Goals
I believe energy drinks are only sugared beverages that have little effect on energy. I hypothesize that the body metabolizes sugars in an energy drink like any other food or beverage.

Methods/Materials
Methods:
1) Checked Blood Glucose Level(BG) for baseline data prior to consuming drink. Noted time on data table.
2)Each test subject had ten minutes to consume entire beverage.
3)Checked BG after 30 minutes; recorded data.
4)Repeated BG checks three more times, every 30 minutes for a total elapsed time of two hours.
**No other food or drink was consumed during the test.
Materials:
-4 test subjects
-4 different energy drinks [list of drinks on displaty]
-OneTouch Ultrasmart Glucometer
-OneTouch Ultra Test Strips
-OneTouch UltraSoft Diabetic Lancing device
-OneTouch UltraSoft Lancets
-BD Alcohol swabs
-Bio-Hazard Waste Disposal Container
-Stopwatch

Results
It was noted that after the initial 30 minutes, all four test subjects showed a dramatic increase in Blood Glucose Levels. Following that, for the next 1 1/2 hours, BG Levels dropped steadily ack to near normal or below baseline levels.

Conclusions/Discussion
In my hypothesis I stated that energy drinks would have little effect on energy and that the body would metabolize the sugars like anything else we consume. My data supports my hypothesis.
The body uses sugars and carbohydrates for energy. Since energy drinks are mainly sugar, the body metabolizes them accordingly. I believe the uses of energy drinks really provide a quick sugar/carbohydrate rush to the body.

Summary Statement
I gave four subjects, four brand energy drinks and measured the effects and modifications on blood sugar.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
James T. Pou

Project Number
S1519

Project Title
Copper and Zinc Contamination as a Factor in Dugesia tigrina Regeneration

Abstract

Objectives/Goals
If copper and zinc pollution is lethal to aquatic organisms, and planarians are highly sensitive to even low concentrations of chemicals, then when amputated planarians are placed in an environment containing copper or zinc, the time it takes to regenerate will be negatively affected by contamination.

Methods/Materials
Planarian regeneration was tested at both a non-lethal and LC50 concentration of copper or zinc. 150+ planarians were used in finding the test concentrations, and an additional 300+ were used in regeneration. Amputated planarians were placed in 12 dish culture wells, 6 for head parts, and 6 for corresponding tail parts. Regeneration was monitored by detecting appearance of photoreceptors or the formation of a translucent triangular tail.

Results
Results in combination with statistical analysis indicate an apparent adverse relationship between the copper and zinc contamination and the regeneration rate of planarians. The T-test for both posterior and anterior regeneration in non lethal solutions assures that the presence of copper or zinc did not affect the regeneration rate and in doing so accepted the null hypothesis. However, the t-test for posterior regeneration in LC50 copper contamination rejected the null hypothesis, indicating with 99.99% confidence that copper did affect the regeneration rate. Furthermore, all specimens regenerating in LC50 zinc died within 1 day of trial initiations. In addition, the X2 test rejected the null hypothesis, which results in supportive evidence that there is a significant difference between the numbers of specimen alive and number dead for trials using an LC50 concentration.

Conclusions/Discussion
The research hypothesis was supported for trials using an LC50 concentration. A possible explanation is the added stress of regeneration lowering the LC50. Another possibility is that the continuous exposure to a lethally contaminated environment retarded regeneration to the point of fatality.A possible expansion is investigating the combined effects of both copper and zinc, since it is likely for both pollutants to be found in the same habitat.
Another continuation is to repeat the experiment using planarians that have successfully regenerated once before in a contaminated environment, and observe what effects the contaminants have on repeated regeneration.

Summary Statement
Freshwater planarians, known for possessing uncanny regenerative capabilities, were utilized in the process of investigating the effect of the common heavy metal pollutants copper and zinc on the regeneration of Dugesia Tigrina.

Help Received
Mr. Kevin Larsen's aid was crucial in the mixing of my various solutions. Mr. Todd Curtis Linke provided immense moral support and wisdom in the process of statistical calulations, all of which were critical in the culmination of my project. Reinhart was a constant source of inspiration and motivation.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Barbara Shinaver

Project Number
S1520

Project Title
The Effects of Herbal Teas on the Ability of Drosophila melanogaster to Withstand Environmental Stress

Abstract

Objectives/Goals
The purpose of my science project is to determine if Drosophila Melanogaster bred on herbal teas are able to withstand environmental stress such as heat and cold.

Methods/Materials
I used two different teas: Green Tea and Ginseng. I chose these teas because they yielded the best results of extending the flies' longevity in my previous experiment. I allowed a generation of flies to reproduce on the specific liquids, and used the newly emerged flies after aging two weeks for my tests. I placed ten males and ten females each in twelve vials for each treatment and stress test. I tested vials of each treatment at higher than normal temperatures, ranging in even increments from 40 degrees Celsius to 46 degrees Celsius in ten minute trials, and at a constant freezing temperature for 35 and 45 minutes. After I removed the flies from their stress tests, I observed and recorded the number of living and dead flies. All flies tested were not reused. After collecting all data, I performed statistical analyses to determine the significance of the data.

Results
Using the ANOVA and S-N-K tests, I discovered that Green Tea helped flies survive both freezing tests and the 42 degrees Celsius heat test. These analyses also showed that Ginseng flies survived more than Green Tea flies in 44 degrees Celsius, and that Control flies thrived at 40 degrees Celsius. The varying high temperature test results warrant further research.

Conclusions/Discussion
According to my statistical analyses, Green Tea improved the flies' ability to endure stress in the freezing tests and in the 42 degrees Celsius heat tests. Ginseng flies thrived at 44 degrees Celsius, while all Control flies lived at 40 degrees Celsius. Overall, Green Tea was the best in helping the flies to withstand environmental stress.

Summary Statement
I used Green Tea, Ginseng, and Distilled Water to show that Drosophila Melanogaster bred on these teas can better withstand environmental stress.

Help Received
Nathan Whittington advisor; Dr. Bert Tribbey consultant for statistical analyses.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
San Singh

Project Number
S1521

Project Title
The Effects of Azadirachta indica Oil on MCF7 Adenocarcinoma Cells

Abstract

Objectives/Goals
The purpose of this experiment was to determine the anti-populous effects of azadirachta indica oil on MCF7 breast cancer cells. Azadirachta Indica is a tree that is known for its incredibly potent medicinal properties, which comes from over 150 various medicinal compounds which can be isolated from the oil, seeds, and bark of the tree. My hypothesis states that azadirachta indica will have an incredibly devastating effect on the population of cancer cells due to its anti-inflammatory, immunostimulatory, anti-oxidative, and anti-adhesive properties.

Methods/Materials
Fully Stocked Cell Culture Lab, MCF7 Breast Cancer Cells, 100% Azadirachta Indica Oil, MTS reagent, Safety Gear
1. Revive and grow frozen MCF7 breast cancer cells.
2. Plate three 96 well plates for the 1 hours, 24 hour, and 48 hour measurements. Within these, create four rows for 1, 2, 5, and 10µL amounts of neem oil and 5,000 MCF7 cells per well. Within these rows, create three repetitions. Then create one more plate for a Standard Curve with 0,5,10, and 20 thousand cells per well.
3. Induce the treatment of neem oil.
4. Incubate the cells according to the amount of time they are labeled for. The Standard Curve will be measured after the first hour, and then again after the fourth hour, as a basis for control. Once the time period has arrived, add the MTS reagent to each well, in doses of 20µL per every 100µL. Incubate the cells once more for another hour to allow for the chemical reaction with the MTS to occur. Then, after this time, use the spectrophotometer to measure the optical density of each well at a wavelength of 490nm.
5. Collect results and analyze the data.

Results
The results of the experiment proved my hypothesis correct. The induction of azadirachta indica oil produced a population drop of a maximum of 83.1% in the cells at 10µL after 48 hours, as compared to the population of the control, which more than doubled within the same amount of time.

Conclusions/Discussion
I discovered that my hypothesis was correct and that azadirachta indica oil had a severe effect on the cancer cells. My findings can be used by researchers trying to create drugs that can reduce the symptoms of cancer. It can also be incorporated in the diets of cancer patients in order to alleviate or even cure the disease.

Summary Statement
This experiment showed that azadirachta indica oil had a dramatic effect on the population of MCF7 adenocarcinoma cells, reducing it by 83.1% with the 10µL dose over 48 hours.

Help Received
Used lab equipment at University of Pacific under the supervision of Dr. Jesika Faridi and graduate student Mr. Ashish Sawhney.

CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Sarah Waliany

Project Number
S1522

Project Title
Role of t-Darpp in Making Herceptin-Sensitive Breast Tumor Cells Become Herceptin-Resistant

Abstract

Objectives/Goals
Breast cancer's genetic makeup determines this tumor's behavior. The Her-2 gene codes for a growth factor receptor that helps cell proliferation. About 20-30% of breast cancers overexpress the Her-2 oncogene. This cancer has a poor prognosis because it metastasizes quickly. The drug Herceptin blocks the Her-2 receptors, preventing further proliferation. However, in 50-70% of Her-2 positive breast cancers, Herceptin fails to prevent further proliferation. It has been discovered that there is an overexpression of t-Darpp in Herceptin-resistant breast cancer cells. This study aimed to determine if an overexpression of t-Darpp in Herceptin-sensitive breast tumor cells can make those cells become Herceptin-resistant.

Methods/Materials
Digestions, gel purifications, ligations, and transformations created a t-Darpp DNA strand. Flow Cytometry identified Herceptin-sensitive SK-BR3 breast tumor cells that were cultured, transfected with t-Darpp, and cultured again. The cells were given different Herceptin concentrations (0M, 0.2uM, and 1.0uM), and the Sulforhodamine B assay stained the protein (measured by a spectrophotometer) found in the cells as an indicator of cell survival on the 7th, 14th, and 21st days after giving Herceptin to the cells.

Results
On day 21, the cells in the control group (without t-Darpp) that did not receive Herceptin (0M) had an average protein biomass of 0.129 while those that received 1.0uM Herceptin had an average biomass of 0.051, indicating that the cells died in the presence of Herceptin. For experimental groups 1 and 2, which were transfected with t-Darpp, on day 7, the cells that did not receive Herceptin (0M) had an average protein biomass of 0.162 and 0.155, respectively, while on day 21, these cells had an average biomass of 0.392 and 0.370, respectively. On day 7, the experimental cells exposed to 1.0uM Herceptin had an average protein biomass of 0.233 and 0.260, respectively, and on day 21, these cells had an average biomass of 0.628 and 0.638, respectively, indicating that the cells grew even in the presence of Herceptin.

Conclusions/Discussion
The results verified the hypothesis that an overexpression of t-Darpp makes Herceptin-sensitive cells become Herceptin-resistant. Further studies can attempt to prevent the overexpression of t-Darpp in Herceptin-resistant breast tumor cells, thereby facilitating breast cancer treatment and increasing breast cancer patients' survival rate.

Summary Statement
The protein t-Darpp can make Herceptin-sensitive breast tumor cells become Herceptin-resistant.

Help Received
Used lab equipment at Beckman Research Institute at City of Hope under the supervision of Dr. Susan Kane and Dr. Long Gu.