Name(s)

Praveen Batra; Michael Kwan

Project Number

J2201

Project Title

The Effects of Farnesol on Pogonomyrex barbatus in a Controlled Environment

Abstract

Objectives/Goals

The red harvester ant, or Pogonomyrex Barbatus, is a common species of ant in the Southwestern United States, and are responsible for many infestation in homes, and in public places across the region. A chemical found naturally in plants, called farnesol, has been tested on the argentine ant, and have produced promising results. Our goal for our experiment was to see if this chemical would be effective against the red harvester, and to possibly apply it to real life situations.

Methods/Materials

Our experiment had two experimental (farnesol) and three control (water) groups. For each group, we placed some ants in a flat plastic square container, using a second container as a lid. Down the center of the container would be a streak of farnesol or water. After spreading the fluid down the center (we attempted to spread it evenly, but due to the small amounts of water/farnesol we used and the effects of water cohesion, this was not always achievable), we set the timer for 5 minutes and recorded every time an ant crossed the line or was turned away. We used two different levels of farnesol/water: 40 microliters and 80 microliters.

Results

Unfortunately, we were unable to obtain significant results due to two main issues: control of the ants and spreading of the water/farnesol. Due to difficulties controlling the placement of ants in the container, different tests had varying levels of ants, not all of which were mobile, and as a result the ratios of crossings/deterrences could not be easily compared.

Conclusions/Discussion

There is great potential for modifications for our experiment, as there are parts of our procedure that could be improved on as well as expanding to include different types of ants. A part of the experiment that had not lived up to our expectations was the center barrier. The liquid, both farnesol and water, would clump into little droplets partway through our experiment, making a physical barrier and also leaving some gaps in our line down the middle. Also, the erratic movement of these ants would be a part that would need improvement, as some of them did not even attempt to approach the center line. Therefore, future experimentation would require better methodologies and excecution to be successful.

Summary Statement

Our project worked at finding a viable ant repellent safe in homes and public uses, but our experimental design led to minor failures and slightly inconclusive results.

Help Received

Name(s)	**Project Number**
Amirah J.X. Battle	**J2202**

Project Title

Fruit Fly Frenzie: The Effect of Temperature on Gender Development of Drosophlia melanogaster

Abstract

Objectives/Goals

Drosophila melanogaster, a small fruit fly, feeds and lives on fruit because of the high sugar content of most fruits. D. Melanogaster originated in Africa, about 10,000 years ago and began migrating north. This species of fly is related to the Musca domestica, common housefly. Fruit flies are one of the most studied organisms in biological research because they are easy to care for, breed quickly, and the females lay many eggs in a short period of time. Traits of the fruit fly are determined by factors such as temperature and several environmental factors. Previous studies have shown that temperature plays a vital role in gender development in fruit flies. Varying temperatures generally produce equal ratios of female to male while controlled temperatures produce higher ratios of males to females. We performed experiments to help determine the effects of temperatures on gender in fruit fly development. We hypothesize that there will be more females born in the varying room temperature vial. The varying room temperature#s environment is more like the natural environment that the flies live in. Our experiment was performed by crossing 20 males with 20 females in vials of fly food in a controlled room temperature (~25°C) and a varying room temperature (~20°-30°C). Our collected data, a higher ratio of female to male flies, demonstrates that temperature does affect gender of the fruit fly development. This project demonstrates the ease in which fruit flies can be used in research and why they are so important in scientific research.

Summary Statement

My project is about how temperature effects the gender of a fruit fly.

Help Received

I was trained and used lab equipment at SFSU under the supervision of Torey Jacques, an undergraduate perusing a degree in Cell and Molecular Biology.

Name(s)

Nshan Blikian

Project Title

Survivor: Worm Edition

Abstract

Objectives/Goals

This project will demonstrate earthworms# growth in three different habitats; dry, moist, and wet. The objective of this experiment is to know if earthworms would have a more successful life by measuring average growth and mortality rates in habitats of dry soil, wet soil, or moist soil, and in turn answer the question of why earthworms surface when it rains.

Methods/Materials

I determined the earthworms# success by measuring an increase or decrease in earthworms# mass and mortality rate over 5 weeks. The subjects were tested on average mass of a live earthworm and life expectancy. Each habitat contained 18 worms in a plastic container filled with 170 grams of soil. The earthworms were fed 3.4 grams of Ritz Crackers on a weekly basis. The live earthworms were counted and weighed with a gram scale, while the dead ones were discarded. Each live worm was cleaned with water before being weighed to prevent particles of soil or materials in the container contributing to an increment in weight. After the weighing process was completed, the worms were placed in a refrigerator until the following week to be counted and weighed again.

Results

The moist habitat#s earthworms had a much more successful life compared to others with average growths of 1.91g to 2.28g per worm and all worms surviving from week 1 to 5 with a 0% (0/18) mortality rate. The dry habitat#s earthworms had some growth with averages of 1.64g to 1.74g, at the end leaving only 14 alive with a mortality rate of 22.2% (4/18). The wet habitat#s earthworms showed strong growth initially 1.78g to 2.33g in week 3, but took a drastic change by week 4 with a 100% (18/18) mortality rate.

Conclusions/Discussion

This supports the idea that earthworms surface during and after rain to avoid getting flooded and suffocate in the soil. Results proved that the earthworms living in the fully saturated soil had died by the end of the 3rd week disqualifying any idea that the worms surface because they like water. The earthworms in the dry soil had good success, but with a mortality rate of 22.2% that some water is needed. My hypothesis was proven correct because the earthworms in the moist habitat had the lowest mortality rate and the highest average mass by the end of the experiment. Worms surface during and after rain to avoid suffocation!

Summary Statement

This project will demonstrate earthworms' success in life by measuring average growth and mortality rates in dry, moist and wet habitats answering the question of why earthworms surface when it rains.

Help Received

Parents purchased worms and supplies from a store and borrowed a gram scale from their friend for weighing. My teacher provided feedback.

Name(s)

Daniel S. Bruce

Project Number

J2204

Project Title

Flight Initiation Distance: Human Presence Impacts on Lagoon Bird Response

Abstract

Objectives/Goals

While observing birds in coastal salt marshes along the California coast, I began to speculate on the possible impact of human presence on birds in these habitats. The goal of this project was to assess the impact of human activity on bird behavior and species diversity by recording the number of people encountered, bird numbers, species diversity, and the Flight Initiation Distance (FID)-the distance from an approaching human at which a bird flees.

Methods/Materials

Four salt marshes, along 100 miles of California coast, were selected based on similar environments and the presence of endangered species such as Belding's Savannah Sparrows and Light-footed Clapper Rails. Field observations of bird quantity, species diversity, and FID, as measured with a laser range finder were made. Noise levels caused by trains, cars, and aircraft were measured with a digital decibel meter. Observations were made over a period of 41 field hours during the winter season of 2013-2014. Data from published literature and monthly bird counts were used for comparison.

Results

An average number of 71 people were observed per hour at the Penasquitos Lagoon, 20 at the Tijuana Estuary, 23 at the San Elijo Lagoon, and 91 at Upper Newport Bay. The average noise levels in decibels, was 65.5 dB at Penasquitos, 62.5 dB at Tijuana, 63.6 dB at San Elijo, and 61.7 dB at Newport. Average FID, in meters, for passerine birds was 5.5 m at Penasquitos, 3.7 m at Tijuana, 1.8 m at San Elijo, and 4.6 m at Newport. Wading birds and Waterfowl did not flee when approached up to 20 meters, which was the closest distance that trail use would allow. There was an inverse relationship between the human activity and the diversity of bird species in the lagoons observed. Noise levels were similar throughout all the lagoons.

Conclusions/Discussion

FID for smaller birds was shorter than FID findings of previously published studies in other lagoons. This suggests possible habituation due to human presence in these four California lagoons. Wading Birds and waterfowl would not flee since they were further from the trails. This FID difference confirms my hypothesis that different bird species are affected in various ways by human activity. The fact that higher levels of human activity were inversely associated with bird species diversity, suggests that human presence may be negatively impacting birds in these lagoons, perhaps by interrupting foraging or nesting.

Summary Statement

The goal of this project was to assess the impact of human activity on bird behavior.

Help Received

My science teacher provided measuring instruments.

Name(s)

Stephany R. Brundage

Project Number

J2205

Project Title

Purple Madness

Abstract

Objectives/Goals

My objective was to see if chickens were blind to purple, or if it is an old family myth, and they stay away from it due to natural instinct from purple things being poisonous in nature.

Methods/Materials

Seven chickens were used, 2 cocks and 5 hens. In the first experiment the chickens were fed a bowl of white rice and a bowl of dyed purple rice to see which color they prefer. In the second experiment the chickens were fed scratch grain that was set on two separate sheets of paper; one purple and one white. In the third experiment I put a purple hair tie, then a white hair tie in front of the birds' beaks to see which color they seemed more interested in. In the fourth experiment the chickens were fed a bowl of popcorn with one piece dyed purple and set on top, and a bowl of plain popcorn. The fifth experiment was actually a side experiment and the chickens were fed a bowl of purple spaghetti to see how much hesitation there was when eating it.

Results

The results of my project were partly inconclusive. The chickens may be blind to purple, but this may still be an old family tale. The results of my project pointed more toward the chickens being blind to purple, but since the chickens have an extra cone in their eyes (the UV cone) along with the RGB cones, they do see colors, but since they have the UV cone, they see UV reflection so colors appear different to them and more reflective things are "brighter".

Conclusions/Discussion

My conclusion is that my hypothesis is wrong, and the chickens may or may not be blind to purple, and according to my project chickens do not stay away from purple due to natural instinct from things being poisonous in nature.

Summary Statement

My project was about seeing if chickens are blind to purple or not.

Help Received

Mother was photographer

Name(s)	**Project Number**
Ryan J. Cantrell	**J2206**

Project Title

The Intergenerational Effect of Obesity in the Male Fruit Fly

Abstract

Objectives/Goals

The objectives of this experiment was to see if obesity in the male fruit fly affected the offspring's BMI, and if there was an effect on the offspring, could that effect be passed down throughout future generations.

Methods/Materials

Fruit flies were separated by sex into two vials, one with normal, company-grade fruit fly medium, and the other with 70% of the same medium, plus 30% of coconut oil. After one week they were weighed, measured and mated with normal females. The offspring were then raised in normal medium until maturity and then they were weighed and measured. This process was repeated again for another generation.

Results

The experimental males became underweight rather than overweight from the coconut oil medium, however, the experiment was continued with these flies. The experimental group's offspring was found to have a small difference in BMI from the control group in the first generation, and that difference increased in the second generation.

Conclusions/Discussion

The conclusion of this experiment is that a father's low BMI appears to have a genetic effect on the offspring. The influence of the father's BMI may have a different effect on subsequent generations depending on offspring gender.

Summary Statement

This project is testing whether or not the father's BMI at pregnancy affects the following generations' BMI's.

Help Received

Mother helped with knowing the topic and the report, Mrs. Gillum helped me finish my project on time, and Carolina Biological provided materials.

Name(s)

Miguel A. Carias, Jr.

Project Title

What Do Red Abalone Raised in Cabrillo Marine Aquarium's Aquatic Nursery Prefer to Eat?

Abstract

Objectives/Goals

For my experiment my objectives/goals were to see if Red Abalone would consume carrots and sea lettuce. Also to see which food the Abalone would consume of the most and how much in average would the Abalone consume of the carrots and the sea lettuce.

Methods/Materials

For my experiment, the materials I used were; a tank full of Red Abalones, Carrots, Sea Lettuce, a pitcher, a small bowl, a spatula, a timer, a scale, a pencil or pen, and a notebook. The methods I used for my experiment were first to gather carrots and sea lettuce and place the carrots in the small bowl and the sea lettuce in the pitcher. Next, I weighed one carrot and some sea lettuce in a scale and weighed each until each weighed the same amount of grams. Then, I would feed one abalone the carrot and another abalone the sea lettuce. Next, I would set my timer for twenty minutes and allowed the abalone's to consume as much as they could from each foods. After the twenty minutes I took out each piece of food out of the abalone's mouths and weigh each food to see how much they consumed of them. Finally I would write my results in my notebook and start the trial again.

Results

My results were that the abalone did eat both carrots and sea lettuce. Also, when finding out the average amount eaten of each foods, it resulted that the abalone ate similar average amounts of the sea lettuce and carrots.

Conclusions/Discussion

In conclusion, I discovered that Red Abalone will not only eat kelp, but will eat carrots and sea lettuce as well. Also that this can benefit aquariums raising Red Abalone because if there is ever a shortage on kelp, the aquarium now knows that they could feed the abalone sea lettuce or even carrots. For further investigations, I would complete more trials because the more trials, the more accurate and efficient my results would be, and instead of working with abalone I would work with another marine animal, such as a sea urchin and feed it two foods that it is uncommon with as well.

Summary Statement

My project is about if a Red Abalone would consume carrots and sea lettuce.

Help Received

Cabrillo Marine Aquarium helped me use their equipment, and work with the abalone. Mother helped me construct my board; and my teacher gave me tips for my report.

Name(s)

Brian J. Cook

Project Number

J2208

Project Title

How Does the Sweetness of the Nectar and the Color of the Feeder Affect the Amount Consumed by Hummingbirds?

Abstract

Objectives/Goals
The objective of my experiment was to determine the ideal combination of nectar sweetness and feeder color to attract Hummingbirds.

Methods/Materials
Six identical clear glass bottles fitted with stopper and Hummingbird feed tube were suspended by copper wire onto a hook and were attached to a stake. Blue or Red colored paper was wrapped around each of the bottles to create two groups of colored feeders. Of the two color groups, there was three levels of sugar concentration for each feeder.

Results
Over the twenty day period, more nectar was consumed from the Red colored feeders than the blue colored feeders. Of the three concentrations of sugar tested in the experiment, the medium concentration of sugar had the highest amount of consumption. The highest concentration of sugar produced the second greatest amount of consumption. The lowest concentration of sugar produced the least amount of consumption.

Conclusions/Discussion
The best combination for attracting Hummingbirds is a Red feeder with nectar that has four cups of water per one cup of sugar ratio. If I were to conduct future experiments, I would test whether or not the shape of a Hummingbird feeder affects the amount of consumption.

Summary Statement

The purpose of my project was to determine the ideal combination of nectar sweetness and feeder color to attract Hummingbirds

Help Received

Dad helped hold the stakes in place while I constructed the stand for the Hummingbird feeder;Dr. Basilious signed the certification forms; Dad taught safety precautions when using a stove. Janica Henzie lended graduated cylinders to me and a helpful book that guided me throughout my experiment.

Name(s)

Aleah J. DenBoer

Project Number

J2209

Project Title

Glow-in-the-Dark Silk Production through the Diet Manipulation of Bombyx mori

Abstract

Objectives/Goals
My goal is to produce glow-in-the-dark silk by manipulating the diet of Bombyx mori.

Methods/Materials
Four separate batches or eggs were ordered. The first two never hatched due to the temperature. The third and fourth batches of eggs hatched successfully in a specially-designed incubator using a cardboard box, 35 watt bulb, heat lamp, glass, and thermometer that blocked light and maintained a temperature of 75-80 degrees Fahrenheit. The Bombyx mori were fed silkworm mulberry chow. Experimental glow-in-the-dark food was fed to experimental Bombyx mori and observed. The experiment was repeated numerous times and is still ongoing.

Results
Glow-in-the-dark silk can be produced through feeding Bombyx mori an original recipe of glow-in-the-dark food.

Conclusions/Discussion
The glow-in-the-dark powder gradually harms Bombyx mori, but still produces glow-in-the-dark silk. I have ongoing research varying the recipe and feeding schedule to have healthier Bombyx mori that will produce more glow-in-the-dark silk.

Summary Statement

Glow-in-the-dark silk can be produced through feeding Bombyx mori glow-in-the-dark food.

Help Received

My father cut the cardboard for the incubator and typed out the report I wrote

Name(s)	Project Number
Cooper A. Drain	**J2210**

Project Title

Acceleration vs. Cell Regeneration

Abstract

Objectives/Goals
The objective is to see how acceleration, G-forces, affect the cellular regeneration of a fresh water planarian.

Methods/Materials
60 planarians were divided into two groups of thirty: a Flight Group and a Control Group. The planarians were then feed and cut in half perpendicular at the midpoint. The Flight Group was taken to a launch site and launched with an E30-7t Arotech engine. The planarians were then taken home; both groups were measured every day for two weeks and their regrowth was recorded.

Results
The Flight Group grew at an average daily rate of 0.23 mm a day while the Control Group grew at an average rate of 0.16 mm a day. The Flight Group also had 8 planarians grow back to at least their original size while the Control Group had only 3 grow back to their original size.

Conclusions/Discussion
The Flight Group grew faster than the Control Group did. These results completely rejected my hypothesis and contradicted all the research I conducted. This may be because I was not able to induce the planarians to the G-forces long enough to damage the cells. The research I conducted states that it is not only the amount of the G-forces, but the time spent under the stress of those G-forces that causes cellular damage.

Summary Statement

How does acceleration affect the cell regeneration rate of fresh water planarian.

Help Received

Mom helped revise paperwork; Dad built payload stopper; Ms. Fisher showed how to cut planarian; Mr. Jovero built the rocket; ROCstock organized launch.

Name(s)	Project Number
Caroline Edmonds	**J2211**

Project Title

Blink and Run: Flashlight Fish

Abstract

Objectives/Goals

Questions: When do flashlight fish light up the most and what may cause it?
Hypothesis: I believe the flashlight fish will light up the most during a feed as flashlight fish supposedly light up to attract their food.
Flashlight fish are small, black fish with light emitting organs (photophores) under their eyes and have split dorsal fins. They are carnivorous & live in dark caves in the Indo-Pacific region about 1000ft down. Little research was available to learn about these fish.

Methods/Materials

1)Observe & record Flashlight Fish for 5 min videos of baseline rest, all feeds,times,cleanings,distractions 2)Narrate video& write notes in journal 3)Process each video with special effect to be able to count light-ups per frame 4)Count number of light-ups every 5 seconds over each 5 min video. Record data points in spreadsheet to compute average light ups/5 min 5) Repeat for each video-94 captured over 14 different days 6)Compare light-up avgs from various activities & times over multiple days.

Results

Light up Counts Avg/5 min:
Rest-defined as no activity in the tank=1.05 avg. School was 14# dia.
Feed=3.79 avg. Active, aggressive, dispersed behavior
Post Feed rest=1.68 avg. 14# school
Cleaning=2.85 Vertical schooling
Night time rest= 0.3 tight school
4.03=frozen mysids & 2.08 for live
Other distractions noted.Time of Day counts varied. More active in AM. Calm at night in sleep mode. Find darkest part of tank.

Conclusions/Discussion

Conclusions:hypothesis is supported. Feeding had highest counts of all the different activities. This has not been quantified before in flashlight fish studies.Feed increased 135% over baseline. Cleaning count slightly higher maybe due to stress.
Beahviors:Schooling patterns noted. AM Aggressive behavior observed, more related to intervals between their last feeding. The fish burn energy lighting up & have high metabolism, so eat often. Scatter plot of rests vs times of day= no correlation but high counts before feeding times, so possibly the fish are expecting to be fed.Sleep behavior noted in late night observations. Fish may possibly prefer different

Summary Statement

I studied when flashlight fish (Anomalops Kapotron) light up the most and what may cause it by sample counting their number of lights-up over 5 min videos and observing behaviors through different activities, times of day, and diets.

Help Received

Mom helped by driving me back and forth to aquarium. Aquarist helped me coordinate feeding times with observations. Dad helped with printing of some display items. Friend helped with clay model for display

Name(s)	Project Number
Ryan J. Golden	**J2212**

Project Title

Can Tree Frog Behavior be Used as an Earthquake Indicator to Save Lives in Developing Countries?

Abstract

Objectives/Goals
My objective in Frogs and Quakes III, is to build on the past two years of projects and see if tree frog behavior could be used as a cost-effective earthquake early warning system in developing countries. In F&Q I, we proved our hypothesis that tree frogs would climb in their tanks around seismic events, but we were limited in our frog behavior data. In F&Q II, we solved the Frog data collection problem with a security camera system, software and a hard disk drive. We found that frogs were 20-30% more active around a seismic event than in-between events. For F&Q III, I need to look for a correlation between the frog behavior and the early primary "P" wave of an earthquake; if the frogs react consistently to the fastest propagating wave then, in theory, one could use their behavior as a warning system before the damaging, secondary "S" wave arrives. Since tree frogs are everywhere around the world, I thought even poor countries could afford to build a tree frog earthquake warning system instead of using expensive seismographic equipment.

Methods/Materials
2 terrariums with 16 Australian tree frogs were observed and their behavior logged on a video system for 10 days. The experiment was conducted at a site on the Maacaama fault centered at 39.29N, 123.25W (in our family room). Seismic activity was downloaded from the USGS for the same period, limited to earthquakes greater than 1.0 on the Richter Scale and with epicenters within a 70km radius around the experimental site. We logged our video data at times adjusted for time-of-flight from the seismic epicenters to our experiment site. Then we loaded the frog behavior data and the seismic data into a spreadsheet for graphing and comparison.

Results
103 seismic events > 1.0 occurred over the 10 days during the experiment after adjusting for aftershocks. The video-log showed that the frogs were more active prior to seismic events at the calculated P wave arrival than during the periods in-between by an average of 2 times.

Conclusions/Discussion
The results show that the frog activity increases and that they actively climb just prior to a seismic event at the arrival of the primary #P# wave. However, their behavior was highly variable and we could find no correlation between frog activity and magnitude of the event. I conclude that it would be difficult to use the frogs as an inexpensive indicator of earthquakes for developing countries.

Summary Statement

My project was designed to see if tree frog behavior could be used to predict earthquakes and provide a cost-effective early warning system for developing countries.

Help Received

My mother helped me glue the printouts onto the board. My brother helped me set-up the cameras. My father helped me buy the Australian frogs and he helped me enter the data into a spreadsheet.

CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s) Atticus J. Humphrey	Project Number **J2213**

Project Title

Nitrate/Nitrite Remediation by Means of Modified Chicken Feed

Abstract

Objectives/Goals

The objective of this study is to identify the most reliable and cost effective solution which will reduce nitrates, nitrites, and phosphates in poultry manure.

Methods/Materials

This test includes 3 independent variables and a control. Test subjects are 8 adult, Rhode Island Red layer chickens in test groups of 2 subjects. Feed modifications will consist of a 2% modified, standard layer feed. The control feed will be 100g of layer feed. 10g of composite chicken excrement from the control subjects each independent variable will be collected daily for ten days. Samples will then be transferred into Ion Chromatograph test tubes and diluted to 10:10, 5:10, and 1:10 dilutions using Millipore water and analyzed by the Ion Chromatograph.

Results

Control:
nitrates 0.3692ppm, nitrites 0.1900ppm, phosphates 3.9494ppm.
Protease Enzyme Modification:
nitrates 0.3571ppm, nitrites 0.2188ppm,
phosphates 3.2914ppm.
Sodium Bicarbonate Modification:
nitrates 0.4153ppm,nitrites 0.2640ppm, phosphates 3.5745ppm.
Charcoal:
nitrates 1.0123ppm, nitrites 0.4781ppm, phosphates 4.3300ppm.
None of the modifications tested reduced nitrite levels when compared to the control group. Protease enzyme did show to reduce nitrates and phosphates levels.

Conclusions/Discussion

This study does indicate that nitrate and phosphate in chicken manure can be affected by means of feed modifications. Nitrite levels did not show reduction with feed modifications. Although, nitrite levels did not indicate reductions, further study should be done with revised testing methods to eliminate sample interference. Protease enzyme modification demonstrated to reduce both nitrate and phosphate levels and has shown in other studies to improve bio-feed conversion rates in chickens.

Summary Statement

Can poultry diet modifications reduce levels of nitrates, nitrites, and phosphates which contribute to the eutrophication of aquatic environments?

Help Received

Conducted sample testing at APPL Labs using a Ion Chromatograph, Dr. Maurice Pitesky helped me with statistical analysis of project

Name(s)	Project Number
Sydney M. Kamerman	**J2214**

Project Title

Roses Are Red, Violets Are Blue, Seagulls Like Green, How About You?

Abstract

Objectives/Goals

If I lay out different colored towels on the beach and put food on each of them I predict that Seagulls are attracted to color and they are attracted to the bright color blue the most because Seagulls live near the ocean where food for survival is found.

Methods/Materials

I set four feeding areas, 1 on a red, green, blue and white towel at Aliso Creek Beach. On white towel I placed a bird deterrent made up of a 20.48cm x 20.48cm red paper with a black circle 20.32cm in diameter. I fed the Seagulls 140 grams of white Market Pantry bread cubed and place in the center of each towel. I placed the towels 152.4cm apart from each other. I timed how fast the food got eaten, 3 different times on 2 different days at the same time of day with similar weather condition and temperature. I video taped and recorded my data. My materials: 1 towel of each color red, green, blue and white 76.2cm x 137.16cm red towel. 1, 20.48 cm x 20.48 red paper with black circle 20.32cm in diameter. 1 tape measure. White Market Pantry bread, 140 grams for each towel for each experiment. Measuring cup, scale, stop watch, video and still Cameras, pencil and paper.

Results

My data proved that Seagulls are attracted to color. Seagulls are attracted to green most. 90% of the time the birds went to the green towel first to eat the bread. They would eat from the blue towel and white towel and lastly the red towel. In fact, they seemed frightened by the red towel. They would flap their wings and were hesitant to land on the red towel. They flew above it and around it but wouldn't land on the red towel. However once a single bird was brave enough to land on the red towel it would peck at the towel a couple of times and then finally it would eat from the red towel. The other birds would then follow.

Conclusions/Discussion

My data showed that Seagulls are attracted to color yet the majority of the time they were attracted to the green color. I would like to see if the color red or other objects would keep Seagulls away. This study would help city workers and environmentalist keep beaches clean and safe from disease. People, businesses and schools who reside near the beach would benefit learning how to keep Seagulls from intruding and possibly destroying their property or being a nuisance. My experiment will benefit bird watchers who want to learn about Seagull's behaviors.

Summary Statement

Are Seagulls attracted to color and if so what color are they attracted to most, red, blue or green?

Help Received

Mother drove me to the beach, bought supplies and helping me organize my project; Brother helped take pictures and video tape during research; My teacher Mrs. Rivero read and edited my written work.

Name(s)	Project Number
Erin K. Lamphear	**J2215**

Project Title

Somewhere Over the Rainbow: A Study of Nectar Color Preference in Anna's Hummingbirds

Abstract

Objectives/Goals
Hummingbirds are amazing creatures, and many people hang feeders to watch the hummingbirds up close in their own backyards. The purpose of my project was to determine if Anna#s Hummingbirds have a preference in nectar color. Observations in my backyard and research lead me to the hypothesis that hummingbirds would prefer warm colors such as, red, yellow, and green.

Methods/Materials
Six 100 ml feeders were filled with a 1:2 sugar to water ratio. Five common flower colors were chosen; red, yellow, green, blue, and purple; clear was used as a control. The feeders were put out on a custom-made feeder bar for four 10-14 day long trials. The nectar remaining in the feeder was measured to determine the nectar consumed over each trial. Then, the feeders were refilled, assigned new random positions, and hung back on the feeder bar for the next trial.

Results
Over the four trials, the hummingbirds consumed 181 ml of red, 191 ml of yellow, 170.5 ml of green, 110.5 ml of blue, 135.5 ml of purple, and 108 ml of clear. The warm colors, red, yellow, and green; were found to be preferred while blue, purple, and clear were least preferred.

Conclusions/Discussion
The warmer colors may have been preferred because they are common amongst flowers Anna#s Hummingbirds visit. Additionally, red and yellow are often seen in commercially produced feeders, causing the hummingbirds to be biased by associating red and yellow with food. Purple was less preferred than red, yellow, and green; and is not as common locally in flowers Anna#s Hummingbirds visit. Blue and clear were selected against demonstrated by their consumption rate which was half or less of the preferred colors. This is supported by research which suggests Anna#s Hummingbirds rarely feed from blue flowers. I theorize that clear nectar, the control, being transparent would be less noticeable to the hummingbirds.

Summary Statement

The purpose of my experiment was to determine if Anna's Hummingbirds have a preference in nectar color.

Help Received

My dad helped me to build the custom-made feeder holder and bar. My mom and my teacher edited my paper.

Name(s)	Project Number
Leana G. Magdaleno	**J2216**

Project Title
Do Ants Have a Sweet Tooth?

Abstract

Objectives/Goals
My science fair project was to see if ants preferred artificial or natural sugars. The sugars that were used were saccharin (artificial), brown (natural/non-artificial), aspartame (artificial), and pure cane (natural/non-artificial) sugars. The ants were harvester ants and they were tested in a plastic bin surrounded by four piles of sugar, two artificial sugars and two natural/non-artificial sugars.

Methods/Materials
In my experiment I placed a plastic bin on a flat surface and placed an anthill in the center of the container. I put two packets of each sugar on a small piece of cardboard and placed the four sugars around the perimeter of the plastic bin.

Results
In my results sixteen out of thirty ants preferred the aspartame sweetener (artificial sugar) over the three other sugars. 53% of the ants preferred aspartame (artificial sugar).So that means more than half the ants preferred aspartame. Eleven out of thirty ants preferred saccharin which is also artificial sugar so that#s 37% of the ants .Two out of the thirty preferred pure cane sugar which is 3% out of the ants. And only two ants preferred brown sugar out of all the other sugars which is 7%.

Conclusions/Discussion
In conclusion the harvester ants preferred the artificial sugars which are aspartame artificial sweetener/sugar and saccharin artificial sweetener/sugar over the natural sugars which were pure cane sugar natural/non-artificial and brown sugar natural/non-artificial.

Summary Statement
The focus of my experiment is to find out the which sugars harvester ants prefer.

Help Received

Name(s)	Project Number
Laura L. Powers	**J2217**

Project Title

Investigating Ant Trail Pheromones

Abstract

Objectives/Goals
I was interested in this project because my family has often had ant problems. Ants secrete pheromones to mark trails to food. I wanted to investigate how pheromones work and how to clean up unwanted trails. For my project, I tested several cleaning materials to see which cleaned the pheromone the best. I think boiling water will clean ant pheromones the best because it will cause it to evaporate. The clean wash cloth will not clean up the pheromone well because it will spread it around.

Methods/Materials
Set up a path to a food source that the ants can find. Place a container upside down in a pie pan filled with water. Attach a Plexiglas path that is 8 in. x 0.5 in. to the top of the container. Fill the indent in the container with sugar water. Capture 6 ants and put at the sugar water. Wait for a trail to form and count the ants. Brush the ants off the trail and container using a soft paintbrush. Clean the pathway with a cleaning material: nothing (control), soapy water, baking soda water, boiling water, a clean washcloth, and ammonia. Replace the path. Time until the trail has reformed to its original number. For the no food test, take away sugar water from the trail and time how long it takes for no ants to come to the container. For the danger test, disturb an ant on the trail and time how long it takes for ants to ignore the warning.

Results
The boiling water took an average time of 98.3 minutes to reform a trail. The clean washcloth took 62 minutes. The ants found the path quickly, but ran in circles. The baking soda took 7 minutes. The ammonia took 17.3 minutes. The soapy water took 22.7 minutes. Control took 17.7 minutes. It took 25 minutes for the for ants to stop noticing the danger pheromone. When close to the warning, the ants became frenzied. It took 66 minutes for ants to stop coming to the sugar in the no food test. A lot of ants bumped antennae to communicate about where the food was. There were more ants at night and late afternoon than in the morning.

Conclusions/Discussion
The boiling water worked the best to clean the pheromone. However, the clean washcloth was the second best. It would not be the best material to use in a house because the ants still found the trail. The cloth spread pheromones around confusing the ants. The boiling water worked the best because pheromones are lipids and evaporate at low temperatures. Ants smell the pheromone in the air and follow it.

Summary Statement
I wanted to investigate how ant pheromones work and how to clean up unwanted trails.

Help Received
Mother helped with handling of ammonia and boiling water.

Name(s)

Rosemary Rojas-Angeles

Project Number

J2218

Project Title

Incomplete Development of Hymenolepis diminuta Ova in Tribolium confusum Beetles

Abstract

Objectives/Goals

The purpose of this project is to confirm if rupture of the rat tapeworm Hymenolepis diminuta ova oncosphere is required for continued hatching and development to the cysticercoid stage within its host Tribolium confusum beetles, and a possible mechanism for doing so. A 1973 paper had noted a singular case of large numbers of undeveloped ova containing fully intact ova in the haemocoel of a dissected beetle with a broken tooth on its mandible. My goal is to find out if cutting a Tribolium confusum beetle#s mandible tooth will affect the hatching of ova inside the beetles.

Methods/Materials

To confirm this, I basically cut or damaged one mandible tooth on 50 Tribolium confusum beetles and fed them Hymenolepis diminuta ova. For comparison I also maintained 50 additional beetles that were fed ova but not treated, and a large culture stock of beetles uninfected. After 20 days I dissected all inoculated beetles and checked for cysticercoids.

Results

My results indicated 38 out of 50 beetles without mandible clipping developed cysticercoids, 6 beetles did not, and 6 beetles died. The test group with mandible clippings 9 out of 50 developed cysticercoids, 27 beetles did not, and 14 beetles died. Examination of beetle mandibles with cysticercoids suggested the mandible tooth clipping may not have been adequate.

Conclusions/Discussion

I concluded that cutting the mandible left undeveloped, intact tapeworm ova and did not allow for hatching supporting my hypothesis.

Summary Statement

The purpose of this project is to confirm if rupture of the rat tapeworm Hymenolepis diminuta ova#s oncosphere is required for continued hatching and development to the cysticercoid stage within its host Tribolium confusum beetles.

Help Received

I received some minimal help from my teacher in clipping the mandibles of the beetles. All other work was my own.

Name(s)	Project Number
James P. Roney	**J2219**

Project Title

Can Ant Pheromones Communicate Food Quality?

Abstract

Objectives/Goals
To determine whether trail pheromones used by Argentine Ants can communicate the quality of a food source.

Methods/Materials
Solutions varying in sugar concentrations were presented separately and simultaneously to a colony of Argentine Ants. In some trials the pheromone trails leading to the two solutions were switched. Photos of each food source were taken every 60 seconds. The numbers of ants were then counted and plotted over time.

Results
As the sugar content of a solution increased, so did the rate at which ants accumulated. In the simultaneous trials, the high concentration solution attracted the most ants, even if the lower concentration solution was discovered first. If the surfaces with the pheromone trails leading toward the low and high food sources were switched, the number of ants moving toward each food source also switched.

Conclusions/Discussion
If ants were already foraging along an existing pheromone trail, the colony would switch its focus to a new, higher quality food source. This shows that a newly laid pheromone trail can communicate not only the presence of food, but also the food's quality. If two pheromone trails were switched, the number of ants moving toward each food source switched as well, helping to eliminate the possibility of the food's quality being communicated by means other than pheromones.

Summary Statement

This project investigates whether trail pheromones used by Argentine Ants can communicate not only the presence of a food source, but also its quality.

Help Received

Father helped with statistics.

Name(s)	Project Number
Ferryn A. Spence	**J2220**

Project Title

Abundance and Diversity of Aquatic Insects Colonizing Different Leaf Species: Does Leaf Matter MATTER?

Abstract

Objectives/Goals
The purpose of my experiment is to determine how different leaf species affect the abundance and diversity of aquatic insects that colonize them, and whether different leaf types affect the relative numbers of each functional feeding group represented in the population.

Methods/Materials
I created 20 leaf packs using hardware cloth and filled each with 23 grams of dry alder, eucalyptus, maple, oak, or artificial nylon leaves (four leaf packs of each type). Next I placed one of each type of leaf pack at four sites in Big Creek, Santa Cruz County. After 25 days, I removed the leaf packs and analyzed each for aquatic insect abundance and diversity using a dissection microscope and an insect key.

Results
In the 20 leaf packs, I counted a total of 3,346 aquatic insects representing 25 different families.
*On average, the control leaf packs (artificial leaves) tended to have fewer insects than leaf packs filled with natural leaves (except eucalyptus), and those insects were slightly less diverse and had fewer different insect families than the other leaf packs.
*On average, alder leaf packs contained the most insects, and the maple leaf packs had the most diverse insect population and the greatest family richness.
*Leaf packs with natural leaf species averaged 64-70% collector-gatherers and 23-32% shredders. In contrast, control leaf packs had the most collector-gatherers (78%) and the fewest shredders (15%). Control leaf packs had far fewer caddisflies.
*There was considerable site-to-site variation in insect abundance and diversity.

Conclusions/Discussion
My hypotheses were that my control leaf packs (artificial leaves) would have fewer insects colonizing them and those insects would be less diverse than other leaf packs. This was generally true for the abundance measurements, as well as the diversity index and family richness. I also thought that the control leaf packs would contain fewer insects that eat leaves for food. This hypothesis was supported by my data, as the control leaf packs had the fewest shredders. In addition, I hypothesized that the leaf packs containing the riparian leaves (alder and maple) would have more insects overall and those insects would be more diverse than those found in other leaf packs. I found that the alder leaf packs contained the highest number of insects on average. In addition, the maple leaf packs had the most diverse insect population and the greatest family richness.

Summary Statement

My science fair project investigates the effects of leaf species on the abundance and diversity of aquatic insects.

Help Received

Name(s)	**Project Number**
Helena R. Washburn	**J2221**

Project Title

Population Management of Plodia interplunctella through Pheromone Confusion

Abstract

Objectives/Goals
The purpose of this experiment is to see if synthetic pheromone can cause mating disruption in the Indian meal moth.

Methods/Materials
Pupae were separated into glass tubes where they transition into moths. The moths are sexed and put into groups. For the Control test 5 female moths are used to bait a trap and 30 feet away 25 male moths are released. After 12 hours the trap is checked. For the pheromone confusion test, 5 female moths are used to bait a trap and placed in the corner of the garage. 25 feet away a trap is baited with synthetic pheromone. 30 feet away from both traps, 25 males are released. After 12 hours the traps are checked for results.

Results
A control test was run using just the female lured trap and after the 12 hour testing period 11 male moths were captured in the female lured trap. A testing trial was then run resulting in 12 male moths captured in the pheromone lured trap and 2 male moths were captured in the female lured trap. The second control trial resulted in 13 males captured in the female lured trap. A testing trial was then run resulting in 5 males captured in the pheromone lured trap and 3 males in the female lured trap. The third control trial resulted in 9 males captured in the female lured trap. A testing trial was run resulting 8 males captured in the pheromone lured trap and 2 in the female lured trap. The fourth control trial resulted in 11 males captured in the female lured trap. A testing trial was run resulting 8 males captured in the pheromone lured trap and 2 in the female lured trap. The final control trial resulted in 8 males captured in the female lured trap. A testing trial was run resulting in 7 males captured in the pheromone lured trap and 3 in the female lured trap.
A control test was required for each trial to alleviate any variability that may have occurred during the moth rearing and sexing process since new moths were used for each trial.

Conclusions/Discussion
The results of this study show that the number of males captured in the pheromone lured traps is significantly greater than the number captured in the traps lured with virgin female moths. The development and application of mating confusion strategies are vitally important in the process of eliminating the need for the use of pesticides.

Summary Statement
Developing a method of insect population control to evetually alleviate the use of harmful pesticides.

Help Received
Mother took photos; Dr. Judy Johnson provided Plodia interplunctella larvae