# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Erin N. Allen

**Project Number**
**J1901**

**Project Title**
## Backyard Bird Watch: The Effects of Introducing Bird Foods on Suburban Bird Populations

**Abstract**

**Objectives/Goals**
My objective was to determine if offering a variety of bird foods would increase the bird visitors in my suburban backyard.

**Methods/Materials**
At first, I observed my yard for three days without bird food present. Then I placed four different types of bird food in a variety of feeding stations. I recorded the number of birds, their species and behaviors at 8:00 AM, 12:00 PM and 4:00 PM for a total of thirty-five days. Each observation period was fifteen minutes long.

**Results**
During the first three days with no food present, I logged only two bird sightings. After thirty-two more days of observation with a variety of foods present, I tallied 720 bird sightings of thirteen different species. The most common visitors were Goldfinches with 372 sightings. The largest total number of birds on a single day was forty-four.

**Conclusions/Discussion**
I concluded that introducing a variety bird foods significantly increased bird activity during the observation period. The most active feeding times were 8:00 AM and 12:00 PM. Birds were rarely seen at 4:00 PM. Black thistle seed was the most popular food and suet was the least popular. My research would aid backyard birdwatchers in having a more successful viewing experience in my area.

**Summary Statement**
I placed a variety of bird foods in my suburban backyard to attract birds and observed and recorded data three times daily for thirty-five days.

**Help Received**
My Mother proofread my report and completed the 12:00 PM observation on school days. My Father taught me how to create graphs with Excel.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Kelley C. Boland

**Project Number**
**J1902**

**Project Title**
## Why They Are Where They Are

**Abstract**

**Objectives/Goals**
There are two species of non-native snails in Morley Field, a San Diego park: the White Garden Snail (Theba pisana) and the Milk Snail (Otala lactea). Last year, for a class project, I studied the snails and found that the two species were only in the weedy plant site and none were in the native plant site. This year I tested the question: Is the distribution of the snails in Morley Field determined by the distribution of their preferred foods? I tested the hypothesis: If I put the two species of snails in tanks with weedy or native food, then I think the snails will eat only the weedy food, and not the native food.

**Methods/Materials**
I tested my hypothesis by collecting leaves from two common species of plants in the weedy site (Wild Radish and Crown Daisy) and from two common species of plants in the native site (Warty-Stem Ceanothus and Laurel Sumac) and setting them up in eight tubs. Each plant species had one tub with snails and one tub without snails (control). I measured the amount of leaf cover and number of leaf holes before and after the two-night experiment. I repeated this experiment a total of three times.

**Results**
I found that the weedy species, especially the Wild Radish, were eaten the most and the native species were hardly eaten at all. Both ways of measuring the amount eaten (percent leaf cover and number of leaf holes) showed the same result. The controls showed no signs of eating.

**Conclusions/Discussion**
My hypothesis, that the snails would eat only the weedy food and not the native food, was therefore supported. I think the snail's preference for the weedy plants is the reason why the snails do not live in the native plant area, where these weeds don't grow. The two species of snails may be dangerous pests in gardens and in farms but I don't think they are going to invade wild lands or native areas because they do not like the plants that grow there.

**Summary Statement**
I tested the food preferences of two species of land snails and found that their preferences determined their distributions in a San Diego park.

**Help Received**
Dad gave general guidance; Dad and brother helped collect plants and snails; Mom helped set up tanks and washed them; Science teacher, Ms. O'Donnell, gave helpful suggestions and encouragement; Head Park Ranger Smith gave permission to go off trails to count and collect.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Meghan R. Carvalho

**Project Number**
**J1903**

**Project Title**
## Will the Autosomal Recessive Mutation of Vestigial Wings Appear in the F1 Generation of Drosophila melanogaster?

**Abstract**

**Objectives/Goals**
The purpose of my project was to show if an autosomal recessive mutation will appear in the first generation. This project also was designed to differentiate the difference between a dominant trait and a recessive trait. Another purpose was to see how a semi-lethal mutation(vestigial wings) effects a population.

**Methods/Materials**
To perform this experiment, I had to do a number of things to insure viable data. I had to first make enough media to fill all the vials, so the flies all had equal living conditions. Then, I had to separate the pupae by wing type and gender to insure virgin flies. Next, I had to wait for the pupae to develop. After that, I crossed the vestigial females with the wild males and the vestigial males with the wild females. After they reproduced, I removed the P1 generation and allowed the F1 generation to develop. When most of the flies hatched, I recorded my data.

**Results**
My data was unexpected. In the final vials, 11.8% of the flies carried the vestigial wing mutation while 88.2% of the flies had wild type wings. I had thought that there would be no flies that carried the vestigial wing mutation, but 2 out of 17 showed the phenotype of vestigial wings. In the first vial, 85.7% of the flies had wild type wings, while 14.2% showed the phenotype of vestigial wings. In vial two, 88.9% of the flies had wild type wings, while 11.1% showed the vestigial wing mutation. In the third vial, 100% of the flies had wild type wings, and 05 had the vestigial wing mutation. The last, fourth, vial had no hatching flies; therefore no flies carried the vestigial wing mutation or wild type wings.

**Conclusions/Discussion**
In conclusion, my hypothesis was not supported. I thought that no flies would show the phenotype of vestigial wings, but some did. I believe the reason for this is that I accidentally placed a vestigial male with a vestigial female during the sexing process. This would provide for both parents carrying the recessive trait, so the offspring would show this vestigial phenotype. Another explanation is that a heterozygous wild fly carried the mutation on one chromosome, but didn't show the mutation. A heterozygous fly crossed with a double recessive fly produces, 50% of the time, a recessive offspring. All in all, this project demonstrated the difference of dominant versus recessive traits.

**Summary Statement**
My project demonstrates the difference between dominant and recessive traits.

**Help Received**
My science teacher helped me order and get my materials; my dad helped my gas the flies

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Kathleen Chelling

**Project Number**
**J1904**

**Project Title**
## How Does the Type of Media Help Quicken the Tunneling of Harvester Ants?

**Abstract**

**Objectives/Goals**
My objective is to use different media to increase the tunneling speed of Harvester Ants. If agar gel is put in with Harvester Ants, then it will quicken the speed of building tunnels more than sand or common soil.

**Methods/Materials**
1. Twenty to twenty-five Harvester Ants per habitat (about one hundred fifty ants total) 2. Three types of media: agar gel, sand, and soil 3. Six habitats, two for each media 4. Magnifying glass 5. Ant food: grass seeds or a tiny piece (one and a half centimeter to two centimeters) of moist bread 6. Fresh water 7. Measuring device: ruler (centimeters) and yarn
1. Get six habitats for the three different Medias: soil, sand, and agar gel. Two habitats per media. 2. Get three Medias for the habitats (equal amount in each habitat): soil, sand, and agar gel. The independent variable is the type of media and the dependent variable is the length of tunnels. The constant variable is the same type and number of ants. 3. Gather twenty-five Harvester Ants for each habitat. 4. Put the soil in the habitat poke two to four holes. Make two holes one inch deep and the other two holes one half of an inch deep. 5. Insert twenty-five Harvester Ants into each habitat. 6. Store habitats at room temperature and wait about twenty-four hours for the ants to start tunneling. 7. Record the tunnels length by measuring the tunnels with the yarn and then measuring the yarn with the ruler. Record the number of tunnels everyday. Record your results in centimeters

**Results**
The agar gel came out with the greatest total length in tunnels. The sand finished second and the common soil last. They were all very close in the length, but the agar gel clearly was the fastest speed. The total mean of the agar gel had twenty-six and thirty-five hundredths more centimeters in tunnels than the sand. The total mean of the agar gel had one hundred one and three tenths more centimeters in tunnels than the soil.

**Conclusions/Discussion**
In conclusion, my results supported my hypothesis. Agar gel will quicken the tunneling of Harvester Ants. Agar gel is a good media to use in scientific research of ants, because it is firm, so tunnels will not collapse; it supplies nutrients, to promote healthy growth; and it prevents fungus and mold growth, so ants live longer. Therefore, agar gel promotes ants to tunnel faster, than sand and common soil.

**Summary Statement**
I found that agar gel helps quicken the tunneling of Harvester Ants more than sand or soil, allowing scientific research on ants to be done easier and more accurately.

**Help Received**
My Mom helped take pictures of me with my project.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Paul T. Cummins

**Project Number**
**J1905**

**Project Title**
## Selection of Case-Building Materials by the Caddisfly Hydatophylax hesperus

**Abstract**

**Objectives/Goals**
I conducted an experiment to determine if larvae of the caddisfly Hydatophylax hesperus (Trichoptera: Limnephilidae) would use unnatural material to build their cases if natural materials were unavailable, and if they would prefer natural materials if they were offered both natural and unnatural materials.

**Methods/Materials**
I forced the caddisflies to rebuild their cases by removing approximately half of the front end of their cases. I weighed each larva with its remaining case, and then provided it with either natural (maple leaves), artificial (paper), or a combination of natural and artificial materials with which it could rebuild its case. Leaf and paper pieces were each cut in 1 cm^2 squares, and a total of 10 pieces was provided to each larva for each trial. For the leaf and paper combination, 5 pieces of each were used. At the end of a 2-day trial, I reweighed each larva and case, and counted the number of pieces that it used in rebuilding its case. I conducted 10 trials for each of the 3 treatments (paper only, leaf only, and paper + leaf), using a total of 30 larvae.

**Results**
I found that the larvae would rebuild their cases with paper if that was all that was available to them, and that the mean weight and number of pieces used in case rebuilding was not significantly different between leaves and paper. However, when larvae were given a choice of both leaves and paper, they showed a clear preference for leaves.

**Conclusions/Discussion**
Scientists believe that caddisflies are very selective about the materials they use to build their cases and that, like all insects, their behavior is fixed rather than flexible. The ability of caddisflies to use unnatural materials in case-building that was shown in my experiment suggests some flexibility in their behavior. This flexibility may be very important in helping the caddisflies to survive during time when their natural case materials may not be abundant. This could happen, for example, if leaf litter is lost when riparian trees surrounding a stream are logged.

**Summary Statement**
My experiment showed that caddisfly larvae were able to use unnatural materials to rebuild their cases when that was all that was available to them, but they preferred to use natural materials.

**Help Received**
Father helped with insect collection; Mother taught me how to use Excel software for data analysis.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Joshua C. Diebel

**Project Number**
**J1906**

**Project Title**
## How Do Different Sounds of Music Affect Ant Behavior?

**Abstract**

**Objectives/Goals**
To find out how ants behavior and productivity is affected by beats,decible levels, and frequency level.

**Methods/Materials**
First, I prepared my six ant hills. Then, I put the ninety Harverter ants in the refrigerator. After that, I chose five different songs with five different beats. Then I put the five ant hills in different rooms with different music, and the last one in a room with no musi. I used a metronome and a decimeter to measure the beat and deciable level. Everyday I drew on the ant hills to mark the progress. In the end, I ended up using five different color markers. At the end, I measured the length of the tunnels and chambers. After that, I made a chart comparing the decible level to the tunnel length. Finally, I drew a conclusion based on the data that was gathered.

**Results**
Final reasults still pending

**Conclusions/Discussion**
From the data that has been collected thus far, it is concluded that it is not so much the beat or the tempo of the music that affected the ants as we thought, but it was the decibel level that affected them the most. The ants that were listening to the music with the higher decibel level dug more and were more unpredictable; while the ants listening to the music with the lower decibel level dug less.

**Summary Statement**
To find out how ants react to different sounds of music.

**Help Received**
Mr. Walls (music teacher) helped me with the sound equpment.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Johannah R. Fernandes

**Project Number**
**J1907**

**Project Title**
## Crackin' Down on Eggshell Thickness

**Abstract**

**Objectives/Goals**
The goal of my project was to try to increase eggshell thickness by adding parsley (Solanum malacoxylon) to my hens diet.

**Methods/Materials**
24 laying hens, all 14 months old, the same breed and genetically nearly identical were used in this project. This represents a 10% sample from our flock. The hens were housed 3 per cage as to monitor the amount of parsley fed per bird and the eggs collected. The thickness of the eggshells were measured for 5 days prior to any addition of parsley. Calipers were used to determine the thickness at the mid-point of the egg post-cracking. Dried parsley flakes (Solanum malacoxylon) was then fed to all hens at one-fourth cup per pen of 3 hens for 10 days. This was in addition to the hens regular lay-mash feed and water. Eggs were then collected and measured with calipers to the nearest 0.01mm from day 1 through day 30 after the addition of parsley to the hens diet.

**Results**
The eggshells were thicker by an average of 0.13 mm. Prior to adding parsley the average was 0.41 mm . After adding the parsley the average was 0.54 mm, an increase of 32%. Solanum malacoxylon has plenty of vitamin D, which helps the binding proteins so that calcium will make stronger eggshells. The results were consistent for all of the days of the experiment.

**Conclusions/Discussion**
Adding parsley to my hens feed increased the thickness of their eggshells. Parsley contains vitamin D which helps with the calcium binding proteins. Eggshells are made up of CaCO3 (calcium carbonate) but need sufficient Vit. D. to bind the calcium. Eggshells that are too thin will break easily and not be sellable. I believe adding parsley to the diet will only work when the hens are being depleted of calcium .. when they are getting older. I would recommend that huge farms that have hens laying eggs in buildings add parsley to the hens diet when the shells become thin. Farmers already add extra calcium to the feed, but if there is not enough vitamin D in the diet, the calcium binding proteins can not work properly. Vitamin D is plentiful from the sunlight, but hens in caged operations do not see the sunlight.
I am eager to discuss my ideas for future projects and inform you of an interesting benefit from the parsley that I had not considered.

**Summary Statement**
Adding parsley (Solanum malacoxylon) to laying hens diet will increase eggshell thickness.

**Help Received**
Dad helped me put up cages and move the hens. Mom helped with graphs.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Rachael S. Frank

**Project Number**
**J1908**

**Project Title**
## Average Cracking Weight of Eggs: Fresh vs. Store Bought, Side vs. Standing

**Abstract**

**Objectives/Goals**
To determine if a fresh egg or store bought egg has a stronger shell and to see if the shell can take more weight on it's side or standing in order to determine the best method of packaging.

**Methods/Materials**
Materials - 30 fresh eggs 30 store bought eggs sparklets water bottle, one plastic popcorn container (empty), ball bearings, gram scale, tin foil, water

Methods - A egg cracking machine was constructed by cutting a plastic container in half to create a sleeve and pisiton when placed inside each other. The egg was placed either on it's side or face up and secured in position with a tinfoil stand. The piston was filled with ball bearings and then the water bottle was placed on top of the piston. Water was slowly added to the empty water bottle until the egg cracked. The weight of the water, the psiton, the water bottle and the ball bearings were recorded on the gram scale as the cracking weight of the egg. The experiment was repreated 15 times each for fresh:side, fresh:standing, store bought:side, store bought:standing.

**Results**
Fresh:standing held the most weight, Fresh:side held the second most, Store Bought:standing the third and store bought:side the fourth.

**Conclusions/Discussion**
Fresh eggs have a stronger shell and can hold nearly twice the weight before cracking. This is consistent with my research which showed that the age of an egg will determine shell strength and also the diet of a chicken will determine shell strength. My fresh eggs were laid by my own chickens and were tested on the day they were laid. Also, they were fed a natural diet of table scraps and whole grains. The fresh eggs had a very narrow range at how much weight the eggs held before they cracked. The store bought eggs had a wide range of shell strength showing they may have different levels of freshness and store bought eggs are fed commercial feed which includes chemicals and other unnatural additives.

The position was not as important as I thought in shell strength, My resaerch showed that the double arch structure of the egg redistributes the weight across the entire egg nearly as well standing as when it is stored on it's side.

**Summary Statement**
Determining the shell strength of eggs based upon their freshness and position.

**Help Received**
Father assisted in my study by pourting the water. Mother helped with hot glue gun on display board.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Lauren Franke; Katherine Trockey

**Project Number**
**J1909**

**Project Title**
## Green Eggs, No Ham: A Chicken Genetics Experiment

**Abstract**

**Objectives/Goals**
This project was a genetic experiment to determine if by crossing two totally different breeds of chicken, a Barred Plymouth Rock cock and a White Aracauna rumpless (no tail) female, the offspring would have the dominant traits of laying blue-green eggs, growing barred feathers, and developing a tail.

**Methods/Materials**
We bred the Barred Plymouth Rock cock and a White Aracauna rumpless (no tail) female, and as the hen laid fertile eggs we placed the eggs in a 100° incubator for twenty-one days. Once the chicks hatched, they were placed in the brooder for 3 - 4 weeks, then they were placed a wire cage, appropriate to their size, for approximately 4 - 6 weeks, with a constant heat source. Then for the next 4 - 6 weeks, the pullets and cockerels were moved to the indoor barn cages also with a constant heat source. At four months old having their adult feathers all grown in, the offspring are released out into the barn with the other hens. During their growth and once the mature, they were provided with appropriate food, water, and a heat source.

**Results**
The result of the breeding included six females (pullets) and five males (cockerels). Three offspring died during development and four were sold. Of the surviving offspring, the three pullets laid a khaki egg (blue-green egg with brown tinting). All of the offspring grew cuckoo feathers, which is a variation of a barred feather. Lastly, six offspring developed a tail, and five developed a rumpless tail (no tail).

**Conclusions/Discussion**
Our conclusion after analyzing the data proved our hypothesis correct.The blue-green egg color is a dominant trait because all of the offspring pullets lay a khaki egg. All of the offspring grew a dominant trait of cuckoo feathers, and six offspring developed a dominant trait of a tail, with five offspring that developed a recessive trait of a rumpless tail.

**Summary Statement**
Our project is a chicken genetics experiment, determining if we can breed and hatch a brood of chicks from two different breeds that have the dominant characteristics of laying blue-green eggs, growing barred feathers, and developing a tail

**Help Received**
In our project we received help from our 7th and 8th grade science teachers, Mrs. Knight and Mr. Dilworth with the genetics format. Also, Mr. Larry Stallings, an APA poultry judge and a retired geneticist, helped us with the traits of the punnett squares.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Kristi S. Fukumitsu

**Project Number**
**J1910**

**Project Title**
## Dining with the Birds: What Type of Seeds Do Birds Prefer to Eat?

**Abstract**

**Objectives/Goals**
There are many types of birds which travel long distances to places were there is a lot of food and warmer weather. These are called migratory birds. Other birds typically stay in the same area. These birds risk the chance of not having enough food. In this case, people may want to help the birds by feeding them. Research and data has shown that the supplemental feeding of resident bird populations can help when there is little food supply such as in the winter. By figuring out the birds preferred seed, we can keep the local bird populations healthy and growing. #Dining with the Birds# was done to find out which seeds birds prefer to eat.

**Methods/Materials**
A bird feeder was built with four different places to eat. Each type of seed (nyjer, millet, sunflower and a commercial mixture) was placed in a bottle feeder in its own section. Sections were identical. The feeder was place in our backyard where birds could feed. Measurements of how much of each seed was consumed were taken and recorded every two days. After readings were recorded, feeding containers were refilled with correct seed. The experiment lasted five recording periods.

**Results**
The results of my experiment showed that the white millet was the most commonly preferred seed. In almost every period, all of the millet seed was eaten. Sunflower seeds were the second most preferred seed with almost half of the seed eaten during each period. During each period, nyjer and the mixed seed were the least preferred. Usually, little or no seed were missing from these trays.

**Conclusions/Discussion**
After completing my experiment, I learned that my hypothesis was incorrect. White Millet was the most preferred seed. While doing my research I believed four types of birds would be feeding. They were sparrows, finches, doves, and pigeons. Since all of these birds feed on sunflower seeds, I thought that they would be eaten the most. During the experiment, most birds were sparrows and finches. My research shows these birds prefer millet. I believe this is why millet was the preferred birdseed in this experiment.

**Summary Statement**
The object of this experiment is to find out what type of seed local birds prefer to eat.

**Help Received**
Father helped build the bird feeder.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Caroline V. Green

**Project Number**
**J1911**

**Project Title**
# The Effect of the Number of Goldfish in a Tank on the Dissolved Oxygen Content of the Water

**Abstract**

**Objectives/Goals**
My goal was to measure the change in the dissolved oxygen content of a fixed volume of water in a fish tank while varying the number of goldfish therein.

**Methods/Materials**
The volume of dissolved oxygen (mg/L) in two identical tanks each filled with 20 liters of tap water was measured with a Vernier dissolved oxygen probe and recorded. One tank served as a control and remained empty of fish. Two goldfish were placed in the other, or experiment, tank. Every half hour, two more fish were added, until the tank contained six fish for the final half hour of readings. The dissolved oxygen content in the experiment tank was recorded throughout the experiment. Control tank readings were also taken at the beginning and end of each half hour interval. The protocol was repeated on a subsequent day to verify the results, with the exception that fish were added in the experiment tank until the final count was eight.

**Results**
The dissolved oxygen content of the experiment tank fell consistently throughout the experiment as fish were added, and remained consistently below the levels recorded in the control tank.

**Conclusions/Discussion**
I conclude that the number of goldfish in a tank has a significant role in the dissolved oxygen content of the water. The dissolved oxygen content of the water decreases as the number of goldfish in a tank increases.

**Summary Statement**
The number of fish in a fish tank directly impact the volume of dissolved oxygen in the water.

**Help Received**
Mr. Penkala helped define the test parameters, provided the instruments and demonstrated the graphing capability of the Excel software. My father helped proofread my report. My mother helped cut out some pictures used on my display board.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Mayte Gutierrez

**Project Number**
**J1912**

**Project Title**
## How Many Holes Should I Put in the Lid? Investigating Oxygen Consumption Differences in Jumping and Flying Invertebrates

**Abstract**

**Objectives/Goals**
My goal was to see if butterflies consume more oxygen than ladybugs or crickets. Since they all fly or jump they need energy to move, and if they need energy then they need oxygen, because in an animal oxygen and glucose produce energy. I hypothesized that butterflies would, on average, consume more oxygen than the other insects because they have very large wings to move and a small body that has to move them.

**Methods/Materials**
I used a metabolism kit to perform each trial with ladybugs, butterflies and crickets. I put a group of one of the types of invertebrates I was testing inside the organism holder and measured their mass. After that I put the organism holder inside the metabolism chamber with 13-15 potassium hydroxide pellets. The pellets absorbed carbon dioxide that was coming from the insects, which created a vacuum so that I could measure how much oxygen the insects were consuming. I recorded the number on the capillary tube that the index solution was passing, which I did each 30 seconds for five minutes. I repeated this process for every trial I performed.

**Results**
My results show that butterflies consume more oxygen than crickets and ladybugs. The mean oxygen consumption for crickets was 0.109 cc/g, the mean oxygen consumption for ladybugs was 0.004 cc/g, and for butterflies it was 0.174 cc/g (g stands for gram of insect mass).

**Conclusions/Discussion**
My hypothesis was supported because butterflies did consume more oxygen than the other insects that I tested. I believe based on my results that butterflies consume more oxygen because they have small bodies and big wings, so they need more energy.

**Summary Statement**
I used a metabolism chamber to measure oxygen consumption rates and volumes for painted lady butterflies, ladybugs, and crickets.

**Help Received**
My science teacher helped me learn how to use the metabolism chamber. My parents helped me get the insects.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Monique C. Iuster

**Project Number**
**J1913**

**Project Title**
## Are Pennies the Solution to Your Snail Troubles?

**Abstract**

**Objectives/Goals**
The goal of my project is to determine whether I can stop snails from eating plants by using a barrier of copper pennies.

**Methods/Materials**
Water, spray bottle, snails, soil, sunflower seeds, trays for planting seeds, pre-1982 pennies, digital camera, camera tripod, volt meter
METHOD TO MEASURE SNAIL DAMAGE WITH/WITHOUT COPPER PENNIES
I grew 25 sunflower seeds in two soil-filled trays until 10 inches tall. In tray 1, I placed barrier of pennies between the sunflower plants. In Tray 2 I had sunflower plants without pennies. I placed 10 snails into each tray, on the opposite side of the tray to the plants. I sprayed plants with water. Every 4 days I added new snails. I took pictures of snail behavior in both trays on the initial placement. I counted the number of plants left in each tray for 8 different days.
METHOD TO MEASURE ELECTRIC POTENIAL OF SNAILS AND COPPER
I measured the electrical potential between the snails' mucus and the copper pennies.

**Results**
After 20 days all the plants with pennys surrounding the plants were still intact. The container that had plants without a penny barrier had only 2 remaining plants. I also measured the voltage between the snail slime and the copper penny. I was able to measure readings of 64 to 130mv.

**Conclusions/Discussion**
My hypothesis was correct. You can repell snails with copper pennies. The snails did not eat any plants from the tray with pennies over the 2 ½ week experiment. All plants except 2 were eaten in the tray without pennies. I also observed that in the penny tray the snails climbed onto the copper pennies, and almost immediately turned and left. In the no penny tray the snails had a field day. They immediately went forward, onto the plants and began eating.
I was also able to measure the electrical potential between the snail and the copper. We found out there was a charge when the snail slime came in contact with the copper penny. This proved my research that snails were shocked because of an electrolytic reaction between the snail slime and the copper.
Although I am sure commercial farmers could not use pennies on their huge farms, perhaps home gardeners might think about pennies as an alternative to pesticides.

**Summary Statement**
My project determined that a barrier of copper pennies dated before 1982 surrounding sunflower seedlings prevented common garden snails from reaching and thus eating the plants.

**Help Received**
Thank you to my mother who helped type the report and the marine biologists Debbie Walton and Ross Clark who helped me understand the concept of an electrolitic reaction and ion disassociation. Also thank you to my dad who created a DVD movie from the pictures I took.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Deanna Kaul; Brittany Ko

**Project Number**
**J1914**

**Project Title**
## Snails: Beware of Repellent

**Abstract**

**Objectives/Goals**
Our project was to find out which materials will best repel snails. We believed that crushed eggshells would work the best in repelling snails.

**Methods/Materials**
We planted nine marigold flowers into the ground and each plant was surrounded by one of these materials we chose for the experiment: hair, aluminum foil, sand, flour, eggshells, chalk dust, garlic, and sawdust. One plant was not surrounded by any materials. We then recorded if the flowers were eaten, how much was eaten, and any other observations we saw for two weeks.

**Results**
The materials that worked the best in repelling snails were the hair and the sand, which protected the plants throughout the entire experiment. The plant with sawdust surrounding it lasted the second longest, ten days. All the rest of the plants lasted less than four days.

**Conclusions/Discussion**
Sand and hair worked the best as repellent. Our hypothesis was not proven true since we thought crushed eggshells would be the best repellent. The texture of a material will see if snails are repelled or not. Our experiment will be able to help people know how to repel snails from their vegetables or flowers.

**Summary Statement**
This project was to find out which materials would be able to prevent snails from eating marigold flowers.

**Help Received**

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Daniel Keeley; Kathryn Keeley

**Project Number**
J1915

**Project Title**
## Feeding Preferences of Woodland Birds

**Abstract**

**Objectives/Goals**
We did our project because we were interested in the eating habits of woodland birds.

**Methods/Materials**
We investigated the effects of location, environment, and seed type and tested the hypotheses by measuring the weight of seeds eaten and by observing which birds ate which seeds under different conditions.

**Results**
In our experiments that tested the effect of location, we found that birds preferred the feeder under a tree, and that the distance from the ground had no effect in the open, but did have some effect under a tree.
In our experiments that tested the effect of environment, we showed that color of the bird feeder had little effect on bird preferences, the presence of a decoy-owl caused birds to avoid the feeder, but if the owl remained there for a week, birds became use to the owl and they were no longer affected by its presence.
In our experiments that tested the effect of seed type, we discovered that birds preferred the bigger sunflower seeds and we found that birds avoided blue and red dyed seeds and greatly preferred the more natural yellow-dyed corn.
In our experiments involving observations, we observed 14 bird species over 13.5 hours. There were strong preferences by species for different seeds. Also, some bird species preferred to feed on the ground and some preferred the feeder. In addition, when the owl was present at least one bird avoided the owl entirely.

**Conclusions/Discussion**
In conclusion, birds have definite preferences and birds differ in their preferences and ability to adapt to different conditions.

**Summary Statement**
In our project we wanted to see if seed-eating birds preferred different conditions during feeding.

**Help Received**
Father helped build bird feeders and proofread report.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Brian M. Luong

**Project Number**
**J1916**

**Project Title**
## Which Spider Web Is the Strongest?

**Abstract**

**Objectives/Goals**
The experimenter#s objective is to find which spider web is the strongest out of the three different spider web that is being tested by an average of 100 grams.

**Methods/Materials**
A method to complete this experiment is by using toothpicks to create the shape of the spider web and using superglue to apply it to the tip of each toothpick so that the thread sticks to it.The materials that were used are toothpicks, super glue, a roll of thread, hot glue gun, four 2 ft. by 2ft. wood frame, a pencil, a black marker, twelve 4in. cylinder wood pieces, twelve 2 in. wood pieces and twelve metal hooks.

**Results**
The result was that the Orb Web is the strongest spider web by an average of around 100 grams.Therefore, my hypothesis was correct that the Orb Web was the strongest. However, the average was different since the Orb Web was stronger by an average of 80 grams, comnpared to the Ladder Web and 120 grams compared to the Gum-Footed Web.

**Conclusions/Discussion**
In the end, the Orb Web was proven to be the strongest. The second strongest out of the three is the Ladder Web and the weakest is the Gum-Footed Web. The reason that the Orb Web was probably the strongest because it#s thread were close to each other so it worked together to support the weight, while the Gum-Footed Web didn#t have much support.

**Summary Statement**
My project is about finding out which spider web is the strongest out of the three tested spider webs and its average strength.

**Help Received**
My father helped drill the wood frame together.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Beth A. Matter

**Project Number**
J1917

**Project Title**
## Does Worm Type or Medium Affect Regeneration?

**Abstract**

**Objectives/Goals**
The purpose of this experiment was to find out if different types of earthworms can regenerate more efficiently than other types, and if the medium an earthworm lives in has an effect on its regeneration.

**Methods/Materials**
To test this, I took nine redworms, nine nightcrawlers, and nine earthworms, and cut them all in half. The worms were split into three groups according to worm type. In each group, three worms were put into separate containers of compost, three were put in separate containers of potting soil, and three were put into separate containers of sand. Only the front ends were used. The worms were measured and observed every three days.

**Results**
The nightcrawlers regenerated an average of 21.2% of their initial body length, the redworms regenerated an average of 1.27%, and the earthworms regenerated an average of 2.9%. Seven out of nine of the nightcrawlers died within a few days. The worms in the potting soil regenerated an average of 19.1% of their initial body length, and the worms in the sand regenerated an average of -2.2%. All worms in the compost died within a few days.

**Conclusions/Discussion**
The results of this experiment disproved my hypothesis that the redworms would regenerate the most. The nightcrawlers regrew the most of their initial body length, followed by earthworms, then by redworms. Seven of the nightcrawlers died. All redworms and earthworms, except for one sick earthworm and the worms in the compost, were healthy and active.

My hypothesis that the potting soil would be the best medium was proven correct. All worms in compost died. The worms in the potting soil and the sand lived, but the ones in the potting soil regenerated more of their initial body length. Worms in the potting soil regenerated an average of 19.1%, while the ones in the sand regenerated an average of -2.2%.

**Summary Statement**
The purpose of my project was to find out if different types of earthworms are able to regenerate more efficiently than others, and if the medium an earthworm lives in has an effect on its regeneration.

**Help Received**
Father helped cut and measure worms, and also helped connect the two boards together

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Mallory L. Meyer

**Project Number**
**J1918**

**Project Title**
## The Golden Ratio and Ammonoid Shells

**Abstract**

**Objectives/Goals**

After a discussion with my science teacher, I decided to focus on fossils. According to Dr. Awramik, professor of geology at UCSB, the study of fossils is an exploratory rather than experimental science. Because of the requirements of the science project, I decided to explore the relationship of the ammonoid shell to the Golden Ratio based on the Fibonacci sequence of numbers.

**Methods/Materials**

Communication with Dr. Stanley Awramik, professor of geology at UCSB gave us information about an open fossil site in California, Union Wash in the White Mountains outside of Lone Pine where an amateur (myself) can collect fossils.

The primary fossil at the site was a mollusk called an ammonoid. I made three trips to the site called Fossil Hill and brought fossil samples home where I organized and measured the rings using a millimeter digital caliper to determine whether or not they followed the Golden Ratio. My father helped me use Microsoft Excel to organize the data. I divided the measurement from the center to the second ring by the measurement from the center to the first ring and graphed the data.

**Results**

The data did not conclusively support my hypothesis the spiral of the ammonoid would demonstrate the Golden Ratio. The average ratio of all samples was 2.6, not 1.618. There were not enough samples to calculate the third ring ratio but the sparse data I had was even farther from the Golden Ratio.

**Conclusions/Discussion**

I revised my original hypothesis to allow for error in measurement because the measurement data did not follow the Golden Ratio: if the measure of the center to the second ring of an ammonoid is divided by the measure of the center to the first ring of an ammonoid, the quotient will be between the range of 1.2 # 2.0 for the actual or real Golden Ratio, as opposed to the theoretical Golden Ratio.

The data still did not conclusively support this hypothesis. The average ratio of all samples was 2.6, not 1.618. There were not enough samples to calculate the third ring ratio but the sparse data I had was even farther from the Golden Ratio.

With aided vision, mentoring, and more accurate measuring, the new data may lead to a different conclusion, more inline with my hypothesis.

**Summary Statement**

My project explores the relationship between the Golden Ratio and the spiral of fossilized ammonoid shells.

**Help Received**

Mother edited; father explained Excel graphs and formulas; professors helped us locate fossil site; parents purchased books and drove me to the site.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Winter R. Patterson

**Project Number**
**J1919**

**Project Title**
## Eye of the Gecko: Color Sight in the Dark of the Night?

**Abstract**

**Objectives/Goals**
Unlike most vertebrates, nocturnal geckos are born without any rods in their retinas, and must depend solely on their cones for nighttime vision. In daylight conditions, Hemidactylus frenatus can see shades of blues and greens. The purpose of my project was to find out whether these geckos could also see these colors in light conditions dark enough where humans and most vertebrates can not detect color.

**Methods/Materials**
I designed a box that contained two tubes. One of the tubes was tagged with the color blue, and the other was tagged with a gray of the same intensity. If the gecko went through the blue tube a reward was given, but if a gecko went through the gray tube, the gecko would be placed back at the start of the box as many times as necessary until the blue tube was chosen. During testing the amount of light in the room was less than 10^-2 cd/m^2. First the geckos had 16 nights of training to get accustomed to the box and the different tubes, and then they were given an additional 16 nights of testing.

**Results**
In the 16 nights that followed training, I found that Gecko #1 chose the blue tube on his first attempt through the box each night 75% of the nights. Gecko #2 chose the blue tube on his first attempt through the box each night 62.5% of the nights. I also found that as the days progressed, both geckos' accuracy increased, even in the final few days of testing.

In addition, I found that from nights 8-32, it never took either gecko more than 2 attempts to choose the blue tube.

**Conclusions/Discussion**
From my results I can not conclude that nocturnal geckos can see color in minimal light. The percentage of times that the blue tube was chosen on the first attempt through the box each night was not significantly high, and do not support my hypothesis because I expected the percentages to be above 80%. However, I did find accuracy to improve over time, and with more trials, I may have found higher percentages in my results. An interesting result that came up was that it never took either gecko more than 2 attempts to choose the blue tube each night. This result informed me about a gecko's intellect rather that a gecko's sight. Hemidactylus frenatus, I learned, must have a memory capable of knowing that if one of the tubes is "wrong", then the other tube must be "right".

**Summary Statement**
Can nocturnal geckos see color in light condtions low enough where humans and most other vertebrates can not?

**Help Received**
Mother bought supplies; Local reptile expert helped with backround research.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Deanna J. Purther

**Project Number**
**J1920**

**Project Title**
## The Effect of Water Temperature on Sea Monkey Growth

**Abstract**

**Objectives/Goals**
The objective of this project was to see which temperature of water would make sea monkeys grow the biggest. The hypothesis was that the 80 degree water would be the most effective on the sea monkey's growth.

**Methods/Materials**
Materials- Three 5 gallon fish tanks, two water heaters, Microscope slide, water, wire, tape, permanent marker, 3 packages of sea monkey refill, 9 jars of the same size that are bigger than 4 oz, measuring cups, and teaspoon measurers
Methods: One tank was heated to 80 degrees, another tank was heated to 70 degrees, and the last tank was left at room temperature (60 degrees). Three jars with four ounces of water were placed in each tank. Then 4/25 of a teaspoon of water purifier was added to all the jars. After 24 hours 4/25 of a teaspoon of sea monkey eggs was added to every jar. After 7 days three sea monkeys out of each jar were taken out and put on a small drop of water on a microscope slide. They were then measured with a ruler in millimeters, and put back in jars. The measurements were recorded in a data graph.

**Results**
The results from this experiment were that the 80 degree water was the best temperature for the growth of the sea monkeys. The average sea monkey size of the 80 degree water was 5.2 mm. The average sea monkey size of the 70 degree water was 2.2 mm, and the average sea monkey size of the 60 degree water was .9 mm.

**Conclusions/Discussion**
In this experiment the data collected supported my hypothesis that the 80 degree water would be the best for the growth of sea monkeys. The project was very accurate because the whole experiment was in an aquarium environment, and the water was kept at a consistent temperature. These results help people that use sea monkeys or brine shrimp as food for other animals. It also helps anyone who just wants sea monkeys as pets.

**Summary Statement**
The focus of this project is to find which temperature of water is most effective on the growth of sea monkeys.

**Help Received**
Teacher gave suggestions on how to do project.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Julia M. Riedelsheimer

**Project Number**
**J1921**

**Project Title**
# Variables that Determine Effectiveness of Fish Predators in Controlling Mosquito Larvae Population

**Abstract**

**Objectives/Goals**
The purpose of my project is to determine which type of fish will eat the most mosquito larvae in five minutes. I have chosen fish that can live in different temperatures and types of water. The reason I am doing this investigation is because there is a virus called the West Nile Virus which is contagious to humans and animals. The way it spreads is the bacteria is in mosquitoes and mosquitoes bite humans and animals which spreads the bacteria. This project is a two year study. In year one the fish were not fed and they were acclimated to the water. In year two the fish are fed twice a day and they were put in a different environment to see if this changed their feeding rate.

**Methods/Materials**
I am using four different species of fish: Guppy, Goldfish, Mosquito Fish, Minnow. They will be put in separate jars to conduct my experiment. The first part of my experiment I will test how quickly the fish eat and how many mosquito larvae the fish eat as they are acclimated to the water in a five minute time period. The second part of my experiment I will put ten mosquito larvae in the water and then add the fish and time the fish to see how quickly they eat and how much they eat not acclimated to the water in a five minute time period. I will do two trials a day for ten days (20 trials).

**Results**
In acclimated water the guppies ate the most larvae averaging at 7.95 mosquito larvae. In acclimated water the minnows ate the first larvae the quickest at an average time of 36.4 seconds. In not acclimated water the guppies ate the most larvae averaging at 8.1 larvae. In not acclimated water the guppies also ate the first larvae the quickest at an average time of 60.6 seconds.

**Conclusions/Discussion**
I learned that when I compare the feeding rate from year one to year two the fish eat less mosquito larvae when they are fed. I also learned that when fish are acclimated to the water they eat more larvae at a quicker rate then if they are not acclimated to the water. I learned that all these fish can be used to control mosquito larvae, although when goldfish are fed they are less likely to eat larvae. Stocking bodies of water is an excellent means of controlling mosquito populations because the fish will eat immature mosquitoes.

**Summary Statement**
I will determine if the shock of a new environment and feeding the fish will make a difference in how much and how fast the fish eat mosquito larvae, compared to last years project where the fish were not fed at all.

**Help Received**
My Mom helped me type my investigation and the Mosquito Abatement District supplied all the mosquito larvae

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Lauren E. Rostykus

**Project Number**
**J1922**

**Project Title**
# Will Temperature Affect the Crawling Speed of Darkling Beetle Larva?

**Abstract**

**Objectives/Goals**
Does different temperatures effect the activity level of beetle larva? We will use crawling speed to determine this.

**Methods/Materials**
Using Darkling beetles, we placed 10 beetles into different controlled temperature environments.
40 degrees, 55 degrees, 72 degrees, 80 degrees, and 90 degrees. (10 beetles in each environment)
- made a track using tagboard I placed oatmeal, apple, and lamp at end of track.
I used these variables for incentive for beetle cross track. lamp was used for heat. placed at different positions.
I recorded time it took for beetls to move across track, and when they started to move.
After one minute if no movement, that was also recorded.
Repeated 10 trails for each temperature environment.

**Results**
The 80 temperature showed the most activity. fastest time across track and started quicker.
72 degrees was pretty close, but not as fast of time. Started about same time however.
55 degrees, little activity. Took a long time for beetles to cross track. Very sluggish. Started moving early, but at a very low rate of speed.
No movement from the two extreme temperatures. 40 degrees and 90 degrees. Beetles were alive however.

**Conclusions/Discussion**
This showed me that temperature does affect larva activity. If you needed to hadle larva and wanted them nonactive, you could place them into lower temperatures. This will not harm them, just slow them down. This also shows that you could control insect activity by keeping cool temperatures around plants instead of pesticide. As long as it wasn't so cold you damaged the plant.

**Summary Statement**
Temperature effects larva activity

**Help Received**
Teacher taught scientific process, mom helped with board and supervision

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Cheng-Hsin V. Shu

**Project Number**
**J1923**

**Project Title**
## The Defense Against Ants II: Why Are Ants Afraid of Baby Powder?

**Abstract**

**Objectives/Goals**
How can people keep ants from entering homes by using natural and nontoxic materials without harming human beings, the environment, and ants at the same time? In my last project, I had found out that baby powder could effectively repel household ants. My objective of this project is to find out what ingredient(s), the fragrance or talc, of baby powder, affected the ant#s three primary senses: sight, smell and touch. With this result, people can now use more effective, economical, and safer natural materials than baby powder, which was not originally designed as an ant repellent to deter ants, without harming people, the environment, and ants.
I hypothesized that the fragrance of the baby powder was the major ingredient that repelled the ants.

**Methods/Materials**
2 plastic boxes,4 glass bottles-wide neck,6, 6 in. clear plastic tubes,4 glass bottles-narrow neck,Air Paper,Jolly Ranchers,Scale,Talc,Rubber Band,Baby powder,Sand Paper,Baby powder (one year old sample),Ants,Timer,Small container,Tape,Gloves,Black cover,Mask. Methods:
Construct the mini maze and also prepare the variables and controls needed.
First the testing of the control setup had to be done, and then testing for each of the variables was conducted. For each microcosm, the variable was altered accordingly.
There were a total of 20 ants used for each experiment, and each experiment was conducted 3 times to ensure accuracy of results.
Each experiment lasted 30 minutes, to ensure proper observation of the ants# behavior.

**Results**
There are 3 findings: 1) Talc, an ingredient of baby powder, was the major material that significantly affect ants# sense of touch. Surprisingly, even the one-year old sample of baby powder with diluted fragrance could affect ants effectively. It showed that the effectiveness and durability of talc to repel ants. 2) The fragrance inside the baby powder also had some effect on the ants# smell sense, but the effect was less desirable compared to the talc. 3) The color of baby powder didn't affect ants# sight sense.

**Conclusions/Discussion**
My solution will help millions of people effectively handle ant problems, while enabling our environment and bodies to remain toxic free. Talc serves as an excellent ant repellent and it may be cost effective and practical to introduce talc itself rather than baby powder as a natural ant repellent. Therefore, making the environment healthy for all future generations.

**Summary Statement**
My objective of this project is to find out what ingredient(s), the fragrance or talc, of baby powder, affected the ant#s three primary senses: sight, smell and touch.

**Help Received**
Dad drove me to the store to pick up the materials needed for the project. Sylvia and Sam profreeded and edited my papers. Mrs. Williams helped me solved complicatoins within the project. And My mom who assisted me in assembleing the board. She was also the one who helped come up with the project idea.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Eric H. Sorensen

**Project Number**
**J1924**

**Project Title**
## Can Bees Be Trained to Find Key Ingredients of Methamphetamine?

**Abstract**

**Objectives/Goals**
The goal for my project was to train bees to find key ingredients of methamphetamine.

**Methods/Materials**
I trained the bees to associate the smell of ammonia or Actifed (cold medicine containing pseudoephedrine) with sugar syrup. Trained bees were tested to see if they could find the target scent hidden among seven identical boxes. Next I tested the bees using an unfamilar container filled with the target scents to see if they could find it at various distances from the hive. I repeated both these tests with the untrained bees as control.

**Results**
In the box test trained bees found the target scents 100% of the time(the untrained o% of the time). Trained bees found ammonia 100% in the unfamilar container test. The bees trained to actifed found it 30% of the time (Untrained bees found it 0% of the trials).

**Conclusions/Discussion**
My conclusion is that trained bees can find key ingredients of methamphetamine.

**Summary Statement**
My project is about training bees to find methamphetamine.

**Help Received**
Mother showed me how to handle bees, supervised grinding of methamphetamine(made sure I wore gloves and face mask) and did some typing on the proceedure.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Tyler N. Swycinsky

**Project Number**
**J1925**

**Project Title**
## What Does a Harris Hawk Prefer to Eat?

**Abstract**

**Objectives/Goals**
My objective was to determine what type of food a Harris hawk prefers to eat, if given a choice of four different types of food.

**Methods/Materials**
The methods of my experiment were to lay all the foods out on a ledge in the Harris Hawks mews, I then would let the bird of prey fly over to the ledge and chose what he wanted to eat. My materials were a Harris Hawk, Quail, Chicken, Beef, and Fish.

**Results**
The results of my experiment were that the Harris Hawk chose the quail the majority of the days. The bird of prey chose quail first four out of seven days. He chose beef first three out of seven days, and he didn#t choose chicken or fish first out of any of the days.

**Conclusions/Discussion**
My conclusion was that the Harris Hawk chose the quail the majority of the days. My hypothesis turned out to be correct.

**Summary Statement**
My project is about finding out what a Harris Hawk would choose to eat on a daily bases.

**Help Received**
My Dad helped me feed the Harris Hawk. My Mom helped me with the layout of my board.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Emily L. Viveros

**Project Number**
**J1926**

**Project Title**
## The Food Preference of Southern Fire Ants

**Abstract**

**Objectives/Goals**
The purpose of this experiment was to determine ant activity and food preference by the Southern Fire Ants.

**Methods/Materials**
The food sources were the following: water, sugar solution, syrup, peanut butter, bacon, and hot dogs. The hot dogs, bacon were cut into small pieces. All the food sources were placed in PVC cup (20mm diameter x 28mm height).Then each cup was weighted in a gram scale. This weight represented the initial weight. The six cups contained the different food sources were randomly placed in a circular pattern on cardboard trays. This procedure was replicated five times. The trays were taken to Southern Fire Ant nest. Ant visits were recorded for seven hours at every hour. Then after 48 hours every cup food station was weighted again to determine the amount of food taken by the ants.

**Results**
Ant activity at 10:00 A.M. was mainly at the bacon feeding and hot dog did not attract ants until 12:00 noon. Ant activity continued to increase by the hour in both hot dog, and bacon. This was not the case for peanut butter, sugar solution, and syrup. After seven hours, the total number of ant visits was hot dogs 3330, bacon 495, peanut butter 26, sugar solution 11, syrup 7, and water 2. The amounts of food taken away by the ants were hot dog 6.99g, bacon 3.12g, and zero for the other food sources.

**Conclusions/Discussion**
The ant activity data showed that from the beginning bacon was the most preferred food. However, hot dog started to show more ant activity as time went on. In fact, by 3:00 P.M both bacon and hot dog were equal in activity. Ants had a minimum interest in the other food sources. It was a surprise to see very little ant activity on the sugar solution since the Southern Fire Ants feed on honeydew produced by some insects.

After 48 hours of feeding exposure 6.99g and 3.12g of hot dog and bacon respectably were taken away by ants. And, there was zero amounts taken away from other food sources. This means that even though there was ant activity on bacon at the beginning of the experiment, ants still preferred hot dog. The reason maybe do to the high amount of fat in this food source.

**Summary Statement**
Determining activity in food preference of the Southern Fire Ant.

**Help Received**
Under supervision of Mario Viveros, UC Farm Advisor

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Dana M. Walker

**Project Number**
**J1927**

**Project Title**
## Distribution of Western Snowy Plover Food at Sands Beach, Goleta

**Abstract**

**Objectives/Goals**
One of my purposes was to find if there are more insects available to plovers as food in the fresh kelp in wet sand or in the dry kelp in the dry sand. My hypothesis was that there would be more insects in the wet sand than in the dry sand. My other purpose was to find the best spots for collecting food for the plover chicks that hatch from abandoned eggs.

**Methods/Materials**
1. Get a permit to do research
2. Make a carrier for the traps
3. Make the traps. The traps should be 4#x6# cards of corrugated plastic labeled A on one side and B on the other. The cards should also be labeled 1-10.
4. Spread Tanglefoot# on both sides of the cards with a putty knife.
5. Choose a day that is not very windy or cold, since insect movement can be adversely affected by both.
6. Erect the cards in the sand near some kelp with side A facing the ocean, noting their location. Run wire stakes through the ends of the cards and into the sand.
7. Note the windspeed and temperature.
8. Wait for 2 hours, then place the cards back in the slots in the carrier and proceed to lab.
9. Secure the first card to a stand, and then use the tweezers to place the insects from each side of the card into different jars of acetone. When the Tanglefoot# has completely dissolved, transfer the bugs from acetone to a labeled jar alcohol. Repeat with the other cards.
10. Empty jar 1A into the Petri dish and place under the dissecting scope. Sort the insects by physical appearance, then count out the amount of each type of bug and record. Return the insects to the jar. Repeat with the rest of the jars.
11. Summarize data in excel for analysis and graphing.

**Results**
Overall, I found that both wet and dry seaweed are good sources of plover food. If you want small flies, you should look in the wet seaweed. If you want to find beach hoppers, look in the dry seaweed.

**Conclusions/Discussion**
In conclusion, my hypothesis was proven correct by the fact that, overall, there are more insects in the fresh kelp in the wet sand than in the dry kelp in the dry sand. One limitation of this study is that I only had samples from one time of day on one day during one season (spring). More samples would have helped to strengthen my conclusion.

**Summary Statement**
I was counting the amount of insects Coal Oil Point Reserve to find the best spots for collecting food for abandoned plover chicks.

**Help Received**
Dr. Cristina Sandoval gave me advice and helped me sort out the insects; my dad watched traps with me and took bugs off traps; Dr. Micheal Caterino IDed bugs.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Courtney H. Walters

**Project Number**
**J1928**

**Project Title**
## Jeepers, Creepers, Where'd You Get Those Peepers? An Investigation of Recessive Eye Color in D. melanogaster

**Abstract**

**Objectives/Goals**
The objective of this study is to determine which eye color will be dominant when you cross a sex-linked recessive white-eyed (w) Drosophila melanogaster with an autosomal recessive sepia-eyed (se) D. melanogaster. I believe sepia should be the dominant trait seen in the F2 generation.

**Methods/Materials**
Four crosses were studied (2 Controls # white F x wild M/sepia F x wild M, 2 Variables # white F x sepia M/sepia F x white M). F1 generation larval cultures (obtained from a company) were counted and sorted by sex and eye color upon hatching. All F1 recessive crosses were made and F2 progeny were counted and sorted as before. All cultures were kept under the same environmental conditions.

**Results**
The Controls confirmed and followed the autosomal and sex-linked patterns for both F1 and F2. The F1 Variables had red eyes (unexpected) and white eyes (expected) and the F2 showed all three eye colors (red [wild color], sepia, white)! The wild eye color was not used in this cross. In only one instance white eyes was more dominant than the red color and even then it was barely. Sepia was the least!

**Conclusions/Discussion**
My hypothesis did not take into account that the dominant red color would surface when the double recessives were split into single recessives. Upon further breakdown of the numbers, it was seen that the autosomal and sex-linked patterns occurred in the F2 as if they came from completely separate crosses. This was because they are on two separate chromosomes. Even though fruit flies are used in this experiment, all genetic research can be used to broaden knowledge and help mankind.

**Summary Statement**
This project is about how recessive eye color genes interact with each other in the fruit fly, Drosophila melanogaster.

**Help Received**
Science teacher gave an early overview of genetics and loaned the dissecting microscope for sexing. Mother helped type report, wrote room temperatures while I was in school, did initial demonstration on handling flies and helped edit report. English teacher proofed report.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
**William T. Whitehead**

**Project Number**
**J1929**

**Project Title**
## Hummingbirds Aren't Colorblind, You Know!

**Abstract**

**Objectives/Goals**
My objective was to discover what color of hummingbird food Anna hummingbirds (Calypte anna) preferred in late fall.

**Methods/Materials**
7 hummingbird feeders (90ml)
White, blue, green, yellow, and pink tape
Yellow, blue, and green food coloring
Clear commercial nectar
Red commercial nectar
Cup hooks
Colored tape was used to cover the red on five feeders to offer different colors: white, pink, yellow, blue and green. Clear nectar was colored to match the colors of tape and feeders were filled. Two feeders were left with red plastic showing; one filled with red nectar, the other with clear. Feeders were hung along a corner of the house 25 cm apart. Three one hour observations were made, during which hummingbird visits were recorded each time they drank from the feeders.

**Results**
First observation: Out of the 28 feeder visits, pink nectar was preferred with 14 visits, clear nectar (white tape) was next in order with 9 visits.
Second observation: Out of the 64 feeder visits, green nectar was preferred with 33 visits, clear nectar (white tape) was next in order with 24 visits.
Third observation: Green nectar was the only feeder visited, with 25 visits.

**Conclusions/Discussion**
I believe that green was the favored color because there were many green hues in our garden during the experiment time (late fall). The few flowers that were in our garden were small and light in color. In my research, I found one published paper with a similar experiment in Arcata, CA. The author (Heather J. Welker, 1980) also found that green was the color favored by Anna hummingbirds in late fall. I plan on investigating this further by repeating the experiment in each season and noting what colors of flowers are blooming at that time.

**Summary Statement**
My project shows that, contrary to popular belief, Anna hummingbirds favor green nectar rather than red, in late fall.

**Help Received**
My mom patiently helped me type and organize my project.

# CALIFORNIA STATE SCIENCE FAIR
## 2007 PROJECT SUMMARY

**Name(s)**
Evin R. Wieser

**Project Number**
**J1930**

**Project Title**
## Attracting Great Whites

**Abstract**

**Objectives/Goals**
To attract Great White Sharks to the surface using their sense of electroreception so researchers can study them. I believe that if a small pulsing electric field is put below the surface of the ocean, then more Great Whites will come to the surface compared to a control.

**Methods/Materials**
I built the device by modifying a standard industry timer so it generated a small electric field that pulsed at the same rate as an elephant seal's heart. I added a waterproof case and leads. I tested the device as follows:
Exp 1: Farallon Islands, CA: I contacted TOPP researchers and they agreed to test my devices during their October shark tagging. I built 3 devices, a control, .5V, and a 3/9V (exchangeable battery) and since I couldn't go on the boat, I gave them to researchers to test.
Exp 2: Shark's Cove, HI: I built 4 more devices using a better sealant and adding a circuit check switch. I tested each device in 3 locations in the cove and 1 location in the ocean for 30 minutes each.
Exp 3: Neptune Islands, South Australia: The first 2 days I tested each device by attaching it to the shark cages. The second two days I tested them by rotating each one on the bait line and on a fishing line for 1 ½ hours each.

**Results**
Exp 1: The .5V device was put in a seal decoy and within 5 minutes, a Great White shark attacked the device. The 3/9V device flooded when tested. The control was tested inside the decoy and did not attract any sharks.
Exp 2: The .5V device attracted fish every time it was tested. None of the devices flooded and all the circuits could be checked and were working.
Exp 3: The first day a Great White took a close pass at the .5V device on the surface cage. The second day, a Great White took a pass at the .5V device on the dive cage. The third and fourth days were stormy and there was no shark activity. Fish were attracted to the .5V device every time it was tested.

**Conclusions/Discussion**
It is difficult to obtain data on Great White Sharks. Although there wasn't enough data to support my hypothesis, the .5V device was attacked once in exp 1 and two different sharks took passes at it in exp 3. I would like to continue testing the .5V device and also test .25V and .1V. TOPP researchers already have plans to test the devices again in the Farallon Islands in Oct. 2007. The .5V device attracted fish every time it was placed in the water so it might be useful in the fishing industry.

**Summary Statement**
My project is about creating a device that generates a small pulsing electric field and testing it in the ocean with the purpose of attracting Great White Sharks to the surface so researchers can study them.

**Help Received**
My Grandpa taught me circuit design and Sal Jorgenson and Scott Anderson did the first test in the Farallon Islands since I couldn't be on the boat. Andrew Fox gave me a research internship in Australia to do my research on his boat. My father helped me to get my diving certificate for this experiment.