



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Tyler G. Baca	Project Number J1901
Project Title Sea Hermit Crabs	
Abstract Objectives/Goals Imagine going through life in a borrowed home. The hermit crab understands this as it must find a suitable shell to live in and protect its soft abdomen. Most research says that hermit crabs change shells when they outgrow them. The purpose of this science project is to determine if this statement is true. Methods/Materials A saltwater tank was set up to house the experiment with four crabs, two small crabs and two large crabs. Each of the four crabs had a letter assigned to it (A, B, C, and D) and was marked with a different color of nail polish. Each of the ten shells was numbered (one through ten) with a waterproof marker. For five weeks, data was collected, at a minimum of twice a day, by recording which shell each of the four crabs occupied. Results During the five weeks of data collection it was observed that each of the crabs behaved in different ways. The larger crabs, A and B, changed their shells more often than the smaller crabs, C and D. Crab D was the smallest and did not change its shell during the experiment which may indicate that D could have been vulnerable to an attack from the bigger crabs. In contrast, Crab B was the biggest and changed shells a lot. Conclusions/Discussion Based on my research, it can be concluded that hermit crabs change their shells for reasons other than growth. As the data shows, the largest crab (B) changed his shell frequently. Often, the shells were the same size. Beginning on December 24, 2005, Crab B changed shells four times over three days, there is no way he could have grown fast enough to require a new shell.	
Summary Statement Most research says that hermit crabs change shells when they outgrow them, this project is to determine if this is true.	
Help Received Mother and Father helped with buying the necessary materials and setting up the saltwater aquarium.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Nicholas C. Bauer	Project Number J1902
Project Title Critical Components of an Effective Fly Trap	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to determine the variables that contribute to creating an effective fly trap.</p> <p>Methods/Materials Two identical fly traps were built using five gallon buckets, nylon window screen, and a coffee can to hold the bait; this allowed one to be used as a control and the other one to test a new variable. To test new variables the traps were baited in the morning and the flies were counted and the released at the end of the day so as not to damage the population. This process was generally repeated to confirm results. The variable that worked most effectively was then used to determine the next step.</p> <p>Results These experiments showed that the location of the fly trap, the type of bait used and the amount of light entering the trap all contribute to the effectiveness of this design.</p> <p>Conclusions/Discussion The fly trap located on lawn was more effective in catching flies compared to the fly trap located at the playhouse. This may be due to the amount of light or the temperature because flies flourish in warmer temperature.</p> <p>Moist dog feces and dog feces with water covering it were tested to determine if a solid surface for fly landing might be important for this trap design. Moist dog feces was a more efficient bait. When comparing moist dog feces, salmon scraps and Humboldt squid as fly bait, squid was the most effective bait.</p> <p>Light inside the trap was shown to be very important and light from the top of the trap or from the sides of the trap were equally effective. However the total amount of light was important based upon experiments that minimized the light on one trap by covering half of the top and leaving the sides covered.</p> <p>Many other components could be significant in the development of a fly trap such as the length of the cone, or if the cone really matters; the direction of the light, whether it#s from the top or side; and the width of the hole at the bottom. The freshness of the bait could also contribute to its attractiveness. Flies also have a need for protein and sugar. A moist sugary substance with lots of protein could attract flies better. The traps height off the ground may influence the trap as well as the distance between the bait and trap for the closer it is the most likely they will be to fly into the trap but the further away the most likely</p>	
Summary Statement To determine the variables that contributes to creating an effective fly trap	
Help Received I would like to acknowledge my Dad, for helping me with the construction of my original fly traps, many helpful tips; my dog, for providing me with fresh dog feces; and my Mom, for her constant motivation and encouragement to get rid of those flies!	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Madeline L.O. Blount	Project Number J1903
Project Title Life in the Spotlight	
Objectives/Goals This experiment explores the question of how the amount of daylight affects the lifecycle of butterflies from the stages of larvae to chrysalis to butterfly. The goal for this experiment is to try to accelerate the lifecycle of butterflies.	
Abstract	
Methods/Materials Method: Put the larvae in individual cups of their own with 6 grams of food in each cup. Divide the caterpillars into three groups of ten and label using the labels. Put each group of ten into separate boxes and place them in a dark area (a closet) with the lights and timers set to various durations of daylight and darkness. Make observations daily until all of the caterpillars turn into butterflies. Materials: 30 Painted Lady butterfly larvae, 3 file storage boxes, 3 florescent daylight bulbs, 30 cups, a cup of larvae food, a scale, a dark place, 6 towels, butcher paper, 3 Intermatic Security timers, Scotch tape, 10 yellow circle stickers, 10 blue circle stickers, and 10 red circle stickers.	
Results The larvae that were exposed to the most light (18 hours of light/6 hours of darkness) became chrysalises and then butterflies first in 18 days. The second group (12 hours of light/12 hours of darkness) were second to finish in 19 days. The last group to finish were in the dark the most, (6 hours of light/18 hours of darkness) and finished the process in 20 days.	
Conclusions/Discussion The data I obtained supported my hypothesis that by having more light each day, caterpillars will develop through the process of a larvae to chrysalis to butterfly the fastest. This information could help endangered species of butterflies by reducing the amount of time in their lifecycle so that more lifecycles could be completed and the population increased.	
Summary Statement This experiment explores how the amount of daylight affects the lifecycle of Painted lady butterflies.	
Help Received My mother helped order Painted Lady larvae and buy the supplies. My dad and my teacher helped proof read the written report.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Hazel Brown; Ari Lindsay	Project Number J1904
Project Title Does Music Affect Chickens' Laying Patterns?	
Abstract Objectives/Goals One day I was out in the chicken coop. I was listening to my ipod. All of a sudden, I thought that it would be interesting and fun to test if music affects chickens# laying patterns. I talked to my partner and we both agreed, and wondered if any body had ever tried the experiment before and thought it would be a unique project. We would like to discover if music really does effect chickens production levels. Methods/Materials We picked three songs, one of each genre. Rock- Heartbreaker by Led Zeppelin, Reggae- One Love by Bob Marley, Classical- a section of the Fifth Symphony by Mozart. We hooked up speakers in the chicken coop. We had 2 control weeks, one before and one after We played each song for one week repetitively from 8:00 am- 4:00 pm. We controlled their food intake, feeding them two pints of Layena egg layer crumble and a half-pint scratch grains. We did not control their water because we do not believe in animal cruelty. Everyday we recorded the weather and how many eggs they layed. Results Music surprisingly has an effect on chickens# egg production. Rock increased their egg production most, with 33 eggs that week. Classical came in second with 30 eggs. Reggae was least with 20 eggs. Conclusions/Discussion we conclude that rock is more effective, but classical is what the chickens would prefer. Rock stressed the birds out by annoying them. (Led Zeppelin from 8-4 day in and day out would be annoying) the more common sound vibrations may have activated there egg system and made them lay more eggs. On the other hand classical soothed them and made it easier for the eggs to come out.	
Summary Statement We tested to see if music effects the number of eggs that chickens lay in a week.	
Help Received Dad helped us rig boom box; parents drove us to buy supplies	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Mackenzie L. Carter	Project Number J1905
Project Title The Impact of Goldfish Food Brands on the Growth of Carassius auratus auratus	
Objectives/Goals The objective of this project was to determine which brand of goldfish food causes Carassius Auratus Auratus (goldfish) to gain the most weight. I believe that Tetra Fin Goldfish Flakes will cause the most growth because of the greater amount of necessary growth components.	
Abstract Methods/Materials Five ten gallon aquariums, each accommodating thirteen goldfish, were used for my project. A separate brand of goldfish food was used exclusively in each aquarium. The goldfish were fed twice daily. Each aquarium was provided an amount of food from its assigned brand that the fish could consume within three minutes per the instructions on the containers. The fish were weighed every four days using an electronic scale for a period of forty-four days. A measured amount of water was added to a beaker and weighed on the scale. After recording the weight all thirteen goldfish were removed from their aquarium using a net and added to the beaker. The weight from the water alone was then subtracted from the weight of the fish, to result in the net weight of all the goldfish from that aquarium. This amount was then divided by the number of goldfish to result in the average weight per goldfish.	
Results The goldfish that were fed Wardley Goldfish Crumbles had the highest average weight gain at 117%. The goldfish that were fed Wardley Essential Goldfish Premium Flakes had the lowest average weight gain at 80%.	
Conclusions/Discussion I came to the conclusion that Wardley Goldfish Crumbles made the fish grow the most. I learned from my research on this project that protein, lipids, vitamin A, and choline are the key ingredients to fish growth. This research, along with the analysis provided on each container of food, is how I derived my hypothesis. From the tests my hypothesis was proved incorrect. I believe that the elements in each goldfish food were key to the growth of the goldfish, but further research is necessary to determine why the unique combination of Wardley Goldfish Crumbles proved to cause the most growth. Additional studies of the individual components in fish food could help to pinpoint which specific elements cause the most growth. Another project using larger goldfish to begin with and/or a longer duration test might help determine if age and maturity have an impact on the growth differences also.	
Summary Statement I tested which goldfish food causes Carassius Auratus Auratus to gain the most weight.	
Help Received Father helped with setup and weighing of the goldfish. Mother helped set up the board.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Ted B. Conroy	Project Number J1906
Project Title Hangin' in the Harbor: A Study of Some Factors Affecting the Growth of Encrusting Marine Organisms	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This study investigates how water depth and the type of substrate affect the growth of marine organisms. The independent variables were the four types of substrates used, and the depths that they were hung at. The abiotic factors of water temperature, pH, dissolved oxygen, salinity, and water clarity were measured weekly at each depth, to see how these would affect the observed growth results.</p> <p>Methods/Materials Substrate materials were clean wood, clean wood painted with anti-fouling boat paint, chemically-treated wood (pressure treated), and clear plastic. All substrates were cut into equal size pieces, and marked with grids to help measure marine growth. Each set of three (surface, middle, and bottom) substrates were connected by equal lengths of rope, and hung on ropes tied between the pilings underneath the end of Johnson Pier. Each set was weighted with a cement anchor to keep the boards from floating up. Once a week, for nine weeks, I paddled out in a kayak with my Dad to record water quality measurements and to record any visible growth on the boards.</p> <p>Results It turned out that my surface boards were actually intertidal because they were out of the water alot at low tides. There was very little growth on all the surface substrates. There was the most growth on the middle level clean wood and plastic boards. I observed growth after just one week, and every week there was more and more coverage. It was easier to see growth on the clear plastic substrates than on the wood. Also the grid grooves cut in the wood boards provided spaces for amphipods and other organisms to hide. These organisms were probably feeding on the microscopic film of algae and diatoms coating the boards.</p> <p>Conclusions/Discussion The surface level boards had very little growth on them because they were out of the water alot at low tides. Only intertidal organisms could survive on them. The middle level boards had more growth on them than the bottom level boards, maybe because they got more sunlight from the surface which increased algal growth. At all levels, the boards with the anti-fouling paint had the least amount of growth on them, followed by the chemical-treated boards. The chemicals on these boards probably interfered with the growth of marine organisms. The clean wood and plastic substrates had the most growth on them, both in coverage and the amount of different types of organisms.</p>	
Summary Statement How do the factors of substrate type and water depth effect the type and amount of growth of encrusting marine organisms?	
Help Received Dad went out with me in kayak weekly. He also helped me cut the wood pieces with a power saw. I used water quality instruments and microscopes from my Dad's work.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Stefani D. Dias	Project Number J1907
Project Title Is the Gulping Rate of a Tropical Fish Affected by the Change in Water Temperature?	
Abstract Objectives/Goals The question I am researching this year for Science Fair falls under the category of Zoology. I am using Tropical Fish to investigate and research my big question #Is the gulping rate of a Tropical Fish affected by the change in water temperature?# What I am hoping to determine with this project is if the gulping rate of the Tropical Fish will be affected by the different changes in water temperature. Methods/Materials In my experiment I will need to follow a series of procedures to complete it. To begin I must buy the proper equipment. Then I will create a stable environment for the fish. After the day of placing the fish in the tank and completing the procedures stated above I will then do nothing but care for them and observe them for two weeks so that the fish can get used to my presence. Every week I will clean the tank and follow basically the same procedures as above, but this time I must wash the tank and only put the fish in the tank after an hour. After two weeks, I will need a new filter for the filter. After two weeks of becoming familiar with the fish and observing them I will start my experiment. First, I will begin by turning on the heaters in two of the tanks and leave one at regular room (76°F) temperature. One tank's temperature, I will change to 78°F and the other tank will be changed to 77°F. Then after two weeks I will count the gulps each individual pair fish have taken and then I record all my data and do the same with the other tanks and fish. Then I will change the temperature once again in the tanks. The same process as above will be conducted two more times at varying temperatures. Then I will record the results and come up with a conclusion. These are the steps that I will need to complete my experiment and answer my big question #Is the gulping rate of a Tropical Fish affected by the change in water temperature?# Results My Hypothesis was correct based on the recorded data and results. The change in gulping rate from temperature to temperature was insignificant. Conclusions/Discussion I have done all my research and based on that and my observations I think that the gulping rate is not affected by water temperature, but can be affected by how clean the water is and how well kept the equipment and fish are cared for. Tropical Fish should be able to adjust to any temperature ranging for 76°F-78°F and their gulping rate still not be affected by the change in water temperature.	
Summary Statement Will the gulping rate of Tropical Fish be affected by the change in Water temperature?	
Help Received My friend Sara Noriega helped me by timing the time with a clock. My teacher help me with typing some of the papers and editing them.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Johannah R. Fernandes	Project Number J1908
Project Title Pavlov's Chicken: A Study in Classical Conditioning	
Abstract Objectives/Goals My objective was to determine if chickens will exhibit the conditioned response of coming to the gate with the ringing of a telephone. Methods/Materials My hens (127 total; 64 Leghorns, 63 Brown hens) were already conditioned to come to the fence when I appear .. knowing that I will feed them a treat of scratch feed. I rang the telephone without me present to make sure the hens did not come to the gate with a bell alone. I did this for two days. I then rang the bell AND feed them scratch, at the same time, and did this once daily for 3 weeks. I then rang the telephone without me present and observed results through a fence to see if they exhibited a conditioned response to a bell. Results When the telephone alone was rang - 67% of the Leghorn hens and 78% of the Brown hens exhibited the conditioned response of coming to the fence. Conclusions/Discussion I accepted my hypothesis of Hens Will Exhibit the Conditioned Response of Coming to the Fence when the Bell From a Telephone is Rang. Not all of the hens came to the fence, however a majority from each breed did. From my conclusions, I have three new possibilities that dovetail from my findings. I am anxious to discuss these and do follow up studies.	
Summary Statement My project determines that chickens will exhibit a conditioned response.	
Help Received Mom and Dad helped with holding and ringing the phone while I scattered the scratch feed. Mom helped with graphs.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Lauren Henderson; Malika Kumar	Project Number J1909
Project Title Brine Shrimp? UV Light? What's the Connection?	
Objectives/Goals To observe the effects of treating brine shrimp with UV light.	
Abstract Methods/Materials 350 brine shrimp; 350 brine shrimp eggs; 21 1-liter containers; 1 UV Lamp; 1 box to perform UV treatment. 1.Gather materials. 2.Fill each container with 1 liter of salty brine water. 3.Put approximately 20 brine shrimp into each container. 4.Designate 2 containers for each time length of UV light. 5.Designate 2 containers to be controls. 6.Now take the two containers for the first time length. Place both of them into the box. Turn on the UV lamp for 10 minutes, and then turn it off. Remove the containers, and compare them to the controls. 7.Repeat step 6 for each time length every two days. 8.Hatch the brine shrimp eggs. (start this while the UV testing is going on.) 9.Divide hatched eggs into three containers. One will be the control. The other two will receive 20 minutes and 70 minutes of UV light respectively. 10.Repeat Step 6 using the two different containers of brine shrimp hatchlings (at different times). 11.Observe them under a microscope compared to the control.	
Results Please see Conclusions	
Conclusions/Discussion Our hypothesis was proven correct because within five days of the first testing, the UV treated brine shrimp died, but the CONTROL brine shrimp continued to live four days longer. Shortly after the UV treatment, the brine shrimp permanently paled in color. This may be because the UV light caused a reaction within the outer covering of the shrimp, which resulted in permanent damage. The brine shrimp treated with 10, 15 and 20 minutes of UV exposure swam extremely quickly, while the brine shrimp treated with 30 to 120 minutes of UV exposure swam slowly. All speeds returned back to normal within 30 minutes from the end of their testing. The UV light may have increased the body temperature of the organisms. When the brine shrimp were treated for longer amounts of time, the radiation might have penetrated into the organisms and caused damage to them. One possibility is that the radiation might have damaged/destroyed the brine shrimp's muscle tissue. The brine shrimp's speeds returned back to normal, so this theory could not be proven true. If we were to conduct this experiment again, we would measure the temperature of the water before and after the UV treatments. We would also add another species to this experiment to see if the effects of UV light were the same or close to those of the brine shrimp.	
Summary Statement It is about observing the effects ultraviolet light on brine shrimp and how it can hurt the environment.	
Help Received Science Teacher helped proofread and organize presentation board.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Taryn R. Holliday	Project Number J1910
Project Title Does Food Source Affect the Behavior of Viviparis malleatus?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Two previous experiments led me through behavioral observation and effects of dissolved oxygen on the Viviparis malleatus (Trapdoor snail). This year's study focused on food source as a behavioral modifier for this lower-order animal. Using a floating and a vertically aligned food source, I tested whether they would vary from their natural habitat of living at the bottom of the pond. I hypothesized that they would alter their behavior in the quest for survival.</p> <p>Methods/Materials The manipulated variables were the food sources of the floating food (Azollo and Duckweed) and the vertically aligned food source (Anacharis and Elodea). Large bowls were set up with the different food sources and trapdoor snails were added. Approximately 60 snails were identified and observed during the project, which lasted from 10/15/05-4/7/06. The responding variable data includes behavioral tallies and weight, both as grouped populations and as individuals.</p> <p>Results Data showed that the trapdoor snails with the food source of Azollo/Duckweed (floating source) were indeed more active. These snails gained a total of 15.8 g. The snails with the Anacharis/Elodea (vertically aligned source) maintained their natural behaviors of staying in the bottom of the bowl. These snails gained an average of 8.1 g. Most importantly, the snails with Azollo/Duckweed were 5 g less than the Anacharis/Elodea population early in the project. By the end of the project, the Azollo/Duckweed snails were within 0.3 g of the snails with Anacharis/Elodea.</p> <p>Conclusions/Discussion Trapdoor snails are natural bottom-dwellers so any change in this behavior can be noted as significant. Since trapdoor snails are gilled, they do not have the oxygen requirements of many pulmonate (lunged) aquatic creatures. Changes in their natural tendencies such as travelling patterns are also significant given that extra activity would require more metabolic energy, thus more food and oxygen.</p> <p>I believe that the snails with the Anacharis/Elodea stayed at the bottom because they did not have to move around the bowl to eat; the food source was readily available and their natural inclination is to stay at the bottom. The snails with Azollo/Duckweed gained more weight because they were eating more often, increasing their activity, and in general, developing into a healthier snail.</p>	
Summary Statement Food source affects behavior of Viviparis malleatus (Trapdoor Snails).	
Help Received Teacher as facilitator.	



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Keaton Hudson; Scott Messier	Project Number J1911
Project Title The Effects of Physical and Biological Factors on Limpet Densities	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals We examined differences in limpet densities in two areas, one between the wave protected and wave exposed sides of the Santa Barbara Breakwater, the other between the mid and high tidal zones of the Breakwater. We wanted to discover if differences in limpet densities are because of physical factors or because of biological factors.</p> <p>Methods/Materials Our first study compared limpet densities in the mid zone between the protected and exposed sides of the Breakwater. We randomly placed ten quadrats along a transect tape estimating the percent cover of mussels, algae, and barnacles, and counted the number of limpets inside each quadrat. Our second study compared the mid and high tide zones on the exposed side of the Breakwater, using the same methods as our first study. Lastly, we conducted a controlled experiment. We created five pairs of two side-by-side plots in both the mid and high zones of the exposed side and recorded the biological communities inside the plots. For one plot from each pair we removed mussels in the mid zone, and barnacles and algae in the high zone. The other plot from each pair was left undisturbed. We returned three times over the next month measuring community changes after the removal compared to before the removal. We compared changes over time between removal and control plots to estimate the effect of removing mussels from the mid zone, and barnacles and algae from the high zone, on limpet densities.</p> <p>Results Our comparative studies found a greater density of limpets on the exposed side, and a greater density of limpets in the high tide zone. After removing mussels from the mid zone, limpet densities did not change in the removal plots relative to control plots. After barnacle and algae removal from the high tide zone, the density of limpets decreased relative to control plots.</p> <p>Conclusions/Discussion In the mid tide zone, wave exposure has a bigger effect on limpet densities than interactions with mussels. The difference in limpet densities between exposed and protected areas could be a result of differences in pollution or larval delivery resulting from wave exposure. In the high zone, interactions with barnacles and algae have a bigger effect on limpet densities than tidal height. Difference in limpet densities between mid and high tidal zones could be a result of a positive association of limpets with barnacles or algae, which are both more abundant in the high than mid zone.</p>	
Summary Statement We examined the effects of physical and biological factors on limpet densities by comparing the protected and exposed sides and the mid and high tide zones of the Santa Barbara Breakwater, and conducting a controlled experiment.	
Help Received Mentor helped conduct experiments, create graphs and edit text. Parents provided transportation.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Sophie H. Klimcak	Project Number J1912
Project Title Electrolocation by the Black Ghost Knifefish: Navigation through a Maze in Complete Darkness	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to test the hypothesis that a Black Ghost Knifefish could navigate an underwater maze in complete darkness using its electrolocation ability to detect metallic landmarks in the maze that guided the fish to its exit.</p> <p>Methods/Materials Two Black Ghost Knifefish were trained to swim through metal and plastic hoops in a dividing wall inside an aquarium in complete darkness. One fish was rewarded with food when it swam through the metal hoop; the other was rewarded when it swam through the plastic hoop. I assessed their learning progress daily and continued their training until each fish made the correct choice more than 85 % of the time. Each fish was subjected to over 2000 trials over a 45 day period where one trial corresponded to the fish swimming through a hoop and either receiving or being denied food. The fish were then separately allowed to navigate a maze in complete darkness that contained metal hoops placed in locations that would guide a fish to the exit of the maze. The amount of time that it took for each fish to successfully navigate to the exit of the maze was measured in 30 trials conducted with each fish.</p> <p>Results Both fish learned that they would obtain food when they swam through the hoop for which they were trained. The fish that had been trained to swim through the metal hoop traversed the maze in approximately half time as the fish that was trained to swim through the plastic hoops.</p> <p>Conclusions/Discussion The Black Ghost Knifefish is known to be capable of detecting electrically conductive objects (larvae) in complete darkness by sensing the disturbance that the object makes in the electric field produced by the fish. Since the experiments were conducted in complete darkness, then the fish must have been using its electrolocation ability to navigate through the maze. The fish that was trained to swim through metal hoops used this ability to locate the metal hoops and find the exit to the maze faster than the fish that was trained to swim through the plastic hoops.</p>	
Summary Statement Two Black Ghost Knifefishes were trained to swim through conductive (metal) and non-conductive (plastic) hoops to determine if their electrolocation ability would allow them to navigate an underwater maze in complete darkness.	
Help Received My father helped me purchase and set up the aquarium, locate and email scientists who had expertise on the Black Ghost Knifefish, read and understand scientific papers about this fish, assemble the training wall and mazes, and helped me record infrared movies of the fish.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Shaunt A. Kouyoumdjian	Project Number J1913
Project Title Maggot Mass Temperature	
Abstract Objectives/Goals Forensic Entomologists are divided on estimating the time of exposure of decaying animal tissue in relation with maggot mass temperature. I believe an increase in maggots on decaying animal tissue will change ADH (Accumulated Degree Hours), accelerating decay independent of ambient air. Methods/Materials Flesh flies laid eggs on six pieces of raw liver. At their third stage of growth called the third instar, I separated the maggots into six groups of 25, 50, 75, 100, 125, and 150 and put them in individual jars with holes so that they can breathe. I used a digital thermometer to take 6 temperature measurements every hour for 20 straight hours for a total of 140 measurements. I made sure that the ambient air temperature stayed the same throughout the experiment. Results The increase in maggots raised the temperature on the decaying tissue against ambient air, but the temperature was not as high as I expected; for example the difference between Jar1 and Jar3 were just .30 degrees (less than a degree), this could be due to the low humidity level in my controlled environment. Conclusions/Discussion I believe that tissue will decay faster and ADH will be affected when maggot activity increases due to higher ambient air, and humidity. Further study is necessary as maggots can self-regulate their own temperature. We also discovered that the smell of rotting beef liver leaves a significant trace of bad odor long after the completion of an experiment.	
Summary Statement Whether maggot mass temperature effects the estimation of time of exposure in decaying animal tissue	
Help Received My father helped with the board and setup of controlled environment.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Chase A.M. Minos	Project Number J1914
Project Title Effect of Acid Rain on Barn Owl Pellets	
Abstract Objectives/Goals The objective of the project is whether acid rain will affect the acidity in Barn Owl pellets dependent on source. The hypothesis states that there will be an increase in acidity of Barn Owl pellets from California due to the increase of acid rain in this area and its possible impact on the food chain of Barn Owls. Methods/Materials Barn Owl pellets and soil samples were collected from El Cajon, California and Springfield, Oregon. The pellets and soil samples were soaked in distilled water for 24 hours and then tested for pH readings. Results The results supported the hypothesis. The average pH from the pellets from California was lower and thus more acidic than the average pH readings from the pellets from Oregon. Oregon Barn Owl pellets had an average pH reading of 7.6. California Barn Owl pellets had an average pH reading of 6.9. Conclusions/Discussion In conclusion, research on acid rain reports that higher acidity in natural waters can change the concentrations of nutrients and poisons. This change may have an impact on the food chain of Barn Owls.	
Summary Statement My project is about determining whether acid rain will affect the acidity of Barn Owl pellets.	
Help Received My Mom helped me with the display board. My Grandma collected pellets in Oregon.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Miranda K. Patrick	Project Number J1915
Project Title Eggcellent Mass	
Abstract Objectives/Goals According to research, the size and mass of eggs can be affected by the amount of fat and protein in a laying hen's diet. Eggs produced from ten Rhode Island Red laying hens were examined in this investigation. It was hypothesized that increasing the amount of peanuts in a laying hen's diet would increase the size and mass of its egg. Methods/Materials This study was conducted over a 10 week period. The hens were fed commercially formulated lay crumbles with 0%, 5%, 10%, 15%, and 0% peanuts in 2 week intervals. The eggs collected in the 2nd week of each feed trial were measured. A digital caliper was used to measure the height and width of each egg and a gram scale was used to measure mass. Results Overall, 0% (initial zero peanut group) had the greatest average height (55.82 mm) and width (43.03 mm). While 5% had the greatest mass (56.82 g) and number of eggs produced (48). However, there wasn't any one trial that showed significant increase in size and mass. Conclusions/Discussion The results of this experiment did not support the hypothesis and could have been affected by the time of year it was conducted. Factors such as environmental temperature and length of day were decreasing, which could have resulted in the hens putting more energy towards body heat rather than egg production.	
Summary Statement This project studied the effects on the size and mass of eggs produced by laying hens, when peanuts were added to commercially formulated lay crumbles.	
Help Received Father helped get hens and hang individual cages; Mother helped shell peanuts and purchased feed.	



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Winter R. Patterson	Project Number J1916
Project Title What Snack Makes Goldfish Smile Back?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project is to determine which type of goldfish food will make goldfish gain the most mass. I predicted that out of three types of foods (bloodworms, goldfish flakes, and veggie rounds) the bloodworms would provide the most mass gain.</p> <p>Methods/Materials Six kitchen bowls were used that had three goldfish in each bowl. Then each bowl was assigned a type of food it would be fed over the next five weeks. Two of the bowls were assigned goldfish flakes, two were assigned spirulina enhanced veggie rounds, and two were assigned freeze dried bloodworms. Every morning and night at 7:15 I gave .1 grams of food to each bowl. After the initial weighing, I weighed the fish once a week for the next five weeks using a balance scale. First I would scoop a small cup of water from one of the bowls then weigh it on the scale. Then I took the three goldfish from that bowl and put them in the cup to be weighed again. By finding the difference of these two weights, I acquired the mass of the three goldfish.</p> <p>Results Every group gained mass after five consecutive weeks although the two groups that were fed the bloodworms gained the most mass. One group gained 2.06 grams of mass while the other gained 1.8 grams. The next largest group was a group fed goldfish flakes that gained 1.76 grams of mass. Following this was a veggie round group that gained 1.75 grams. The other group fed goldfish flakes gained 1.63 grams, while the other veggie round group gained 1.38 grams. If you add up the mass gains for both the bloodworm groups you get a total of 3.86 grams of mass. Therefore the goldfish fed bloodworms gained the largest total mass. The goldfish flake groups came in second with a total of 3.39 grams gained, and the veggie rounds had the least total mass gain at only 3.13 grams.</p> <p>Conclusions/Discussion The results supported my hypothesis. I had based my hypothesis on my knowledge of how protein is the main factor for growth in fish. Previous research stated that proteins provide essential amino acids and therefore boosting this amount would make a goldfish grow larger. The bloodworms had the highest protein level (55%), followed by the goldfish flakes (42%). The veggie rounds had the least amount (34%). Because of the differences in protein levels, this is probably why my results came out the way they did. The information I acquired may be helpful to fish farmers and pet owners who want to grow larger fish.</p>	
Summary Statement Of the three types of fish foods: goldfish flakes, spirulina enhanced veggie rounds, and bloodworms; bloodworms provide the most mass gain in goldfish, followed by goldfish flakes then veggie rounds.	
Help Received My mom took me to the pet store to purchase all the needed materials and helped me to accurately measure the right amount of food for each feeding. My science teacher taught me how to use a balance scale. Jeremy Smith from the pet store told me which types of foods would be safe for goldfish.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Julia M. Riedelsheimer	Project Number J1917
Project Title Comparing Different Fish Species as Natural Predators in Controlling Mosquito Larvae Population	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project is to determine which type of fish will eat the most mosquito larvae in a five minute time period. I have chosen fish that can live in different temperatures and can live in rivers, ponds, lakes and standing water. The reason I'm doing this experiment is because I'm concerned about the West Nile Virus which is spread by mosquitoes. My hypothesis is that the mosquito fish will eat the most mosquito larvae and they will eat the first mosquito larvae in the quickest amount of time.</p> <p>Methods/Materials I purchased three Minnows, Goldfish, Mosquito Fish, Koi and Guppies. I gathered five pickle jars and placed three spieces of each fish in the same pickle jar. I put ten mosquito larvae on a screen and dropped them in the jar. I used a stopwatch and timed how quickly the fish ate the larvae in a five minute time period. I repeated this procedure with each spieces of fish. Two different times will be recorded. The first time is how quickly the fish ate the larvae and the second time is how many mosquito larvae the fish ate in a five minute time period.</p> <p>Results My hypothesis was not correct. The Guppies ate the most mosquito larvae at an average of 9.9. The Koi fish ate the least amount of mosquito larvae at an average of 7.7. The second part of my experiment timed how quickly the fish ate the first mosquito larvae. My hypothesis was not correct. The Goldfish ate the first mosquito larvae the quickest on a average of 6.2 seconds. The Koi Fish took the longest amount of time at a average of ten seconds.</p> <p>Conclusions/Discussion I learned from doing this experiment that the fish I selected will eat mosquito larvae just as well as mosquito fish and can be used to control mosquito larvae population.</p>	
Summary Statement My project is to determine which type of fish will eat the most mosquito larvae.	
Help Received Mother helped time the fish as I observed and wrote times down.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Max G. Ross	Project Number J1918
Project Title Ants and Plants	
Abstract Objectives/Goals The objective is to find out if white sage and eucalyptus concentrates repel argentine ants. The information discovered in this experiment can help make a less toxic ant repelent to people and repel ants but not kill them. Methods/Materials I used six ant farms with ten ants in each farm. Then I put ten drops of a white sage concentrate into two farms and the same with a eucalyptus concentrate in another two farms. I didn't put anything but water into my remaining two ant farms because they were my control group. Then I put a piece of food in between where the chemicals had been placed and the wall of the farm. After leaving the ants alone for five days I measured in centimeters how far to the left, right, and down the ants tunneled away from the concentrates. I measured the closest tunnel to the concentrate, not the farthest. Results The ants avoided the plants by tunneling far below them or to the left and right of them. In the two sage ant farms the ants avoided the sage to the left a total of 18 cm, to the right a total of 11.5 cm, and down a total of 6.5 cm. In the eucalyptus farms the ants avoided the concentrates by 15.5 cm to the left, 14.5 cm to the right, and 6 cm down. In the control group the ants tunneled right through where the drops were in the other farms. Conclusions/Discussion I wanted to find out if white sage and eucalyptus repeled ants. I did so by making concentrates of the two plants and putting them into ant farms and recorded the ants reaction. It turned out that they avoided both plants significantly and tunneled right through where the drops were placed in the control group.	
Summary Statement My project's purpose was to find out if ants avoided white sage and eucalyptus because I never spotted any ants near those plants in the wild.	
Help Received Mom matted my titles on colored paper for me.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Amanda Rudnick; Susan Vicuna	Project Number J1919
Project Title Do Bees Buzz For Candles?	
Objectives/Goals Our objective was to see if bees are attracted to scents.	
Abstract	
Methods/Materials 1. 100 honeybees; 2. 10 scented candles and 1 unscented candle ; 3. flashlight; 4. 2 PVC Pipes, 4 elbow connectors, and 4 T connectors; 5. Hack saw; 6. screen netting; 7. graph paper; 8. vacuum; 9. scissors; 10. centimeter ruler; 11. a room dark room with temperature set to 21 degrees Celsius (70 degrees F) ; 12. 1-2 dish towels; 13. hot glue gun; 14. timer; 15. note book; 16. pen or pencil; 17. 4 cm candles holders, 1 cm tall.	
A brief procedure of the experiment is as follows: 1. Build a 51cm by 61cm by 51cm cage out of PVC Pipe, elbow and T connectors, and screen netting; 2. Cut a 53cm by 63 ½ cm piece of graph paper; 3. In the center of the paper draw a circle and then a bigger circle around it; 4. Take 10 different scented candles and 1 unscented candle and dye them black; 5. Put the candles in the cage evenly spaced and put ten of the honeybees inside; 6. Place the cage over the graph paper; 7. Time for 10 minutes and record how many honeybees are attracted to each candle.	
Results The sweet honeysuckle candle attracted the most bees at an average of 3 (25%).	
Conclusions/Discussion The hypothesis was if one hundred honeybees smell a sweet honeysuckle scented candle, then they will be most attracted to that candle. The results showed that the sweet honeysuckle scented candle attracted the most honeybees. Therefore, the hypothesis was supported. The results showed that the sweet honeysuckle scented candle attracted the most honeybees.	
Summary Statement Our project is about the affect of candle fragrances on bees.	
Help Received Joe and Pam Romance supplied bees; Pam Romance helped build the cage.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Kassandra G. Savage	Project Number J1920
Project Title Do Fruit Flies Have Food Preferences?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of the project Do Fruit Flies Have Food Preferences is to determine if the fruit fly has fruit food preferences if given the choice to choose between 7 fruits and a control if they all have the same size, shape, temperature, and moisture. The fruit food sources that were used for the experiment are the following: banana, papaya, pineapple, orange, watermelon, apple, cantaloupe, and none, the control.</p> <p>Methods/Materials A maze-like structure was built out of eight clear plastic containers at one end attached to a larger plastic container by clear plastic tubing. Fifty fruit flies were gathered. Seven fruit food sources were cut up in the same size, shape, temperature, and had the same amount of moisture added to them. The temperature of the fruits was recorded using a thermometer and the moisture was added to the fruits with a tablespoon of water with a temperature of 40 degrees Celsius. Lastly, the time which was given for the fruit flies to travel through the maze-like structure was recorded using a stopwatch.</p> <p>Results After doing 30 trials, the average number of fruit flies at each piece of fruit is as follows. A slice of banana had an average of 13.4 fruit flies attracted to it. The papaya had an average of 10.1 fruit flies attracted to it. The piece of cantaloupe attracted an average of about 5.3 fruit flies. An average of 4.9 fruit flies were consuming the pineapple. The orange had an average of 4.7 fruit flies attracted to it. The slice of watermelon attracted an average of approximately 4.4 fruit flies. The apple had an average of 4.2 fruit flies attracted to it. Lastly, the plastic container with nothing in it had an average of 3.3 fruit flies attracted to it.</p> <p>Conclusions/Discussion The hypothesis was if various fruit food sources are tested, a slice of banana will attract more fruit flies than slices of papaya, cantaloupe, pineapple, watermelon, orange, apple or none, if they are all similar in size, shape, temperature, and moisture. After running 50 fruit flies through a maze-like structure consisting of clear plastic holders with fruit at the end, connected to a base by clear tubing, the results showed that a slice of a banana attracted more fruit flies than plastic containers holding the other options. The hypothesis based on fruit flies being attracted to bananas more than other fruits was supported significantly enough to show their fruit food preferences.</p>	
Summary Statement The project Do Fruit Flies Have Food Preferences is based on which fruit food source the fruit fly prefers if given eight plastic holders containing fruit with the same size, shape, temperature, and equal amount of moisture added to them.	
Help Received Father helped cut holes on the sides of the plastic containers in order to attach them to the base with clear plastic tubing.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Anush Shaginian	Project Number J1921
Project Title Does the Distance between Ants and Food Affect the Percentage of Ants that Go to the Food?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I wanted to find out whether ants would go to a certain food regardless of how far it is from them. I wanted to observe the characteristics of ants.</p> <p>Methods/Materials I collected ants from our back yard in cups and placed 5 ants on a certain point marked by tape one meter away from 28.3 grams of sugar. I started the stop watch and recorded the percentage of the ants that went to the sugar in 10 minutes. I repeated this 3 more times. I repeated this entire procedure 3 more times except this time testing 5 meters, 10 meters, and 15 meters distance from the ants and sugar.</p> <p>Results At 1 meter distance between the ants and sugar the average percentage of the ants that went to the sugar was 100%. At 5 meters distance between the ants and sugar the average percentage of the ants that went to the sugar was 95%. At 10 meters distance between the ants and sugar the average percentage of the ants that went to the sugar was 70%. At 15 meters distance between the ants and sugar the average percentage of the ants that went to the sugar was 25%.</p> <p>Conclusions/Discussion In this experiment, as the distance between the ants and the sugar increased, the average percentage of ants that went to the sugar decreased. When the distance between the ants and the sugar was increased from 1 to 5 to 10 to 15, the average percentage of ants that went to the sugar decreased from 100% to 95% to 70% to 25%. These results contradict my hypothesis because I predicted that as the distance between the ants and the sugar increase, the percentage of ants that go to the sugar would stay the same. I think that my hypothesis was wrong because even though ants can smell sugar from over a mile away, not all of them would be willing to go all the way to that location. I believe that each ant behaves differently from other ants, like humans. I have seen people give out free food on some occasions. I have also witnessed quite a lot of people saying, "I'm too lazy to go all the way there," The same might be true for ants; some are willing to go while others are not.</p>	
Summary Statement This project tests the relationship between ants and a pile of sugar.	
Help Received Teacher proof read my report.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Cheng-Hsin Vincent Shu	Project Number J1922
Project Title The Defense against Ants	
Abstract	
Objectives/Goals Problem Statement: How can people keep ants from entering a home without harming the creatures at all? My objective is to find out what can repel ants yet not harm them in any way by using natural house hold items or products that can be easily bought.	
Methods/Materials Materials: 2 plastic boxes with 2 thin sheets of paper 4 clear plastic cups 2 clear plumbing pipes 4 clear plastic cup covers Masking tape Jolly Ranchers Scissors Lemon slices Rubber bands Baby powder Hot cayenne pepper Garlic Cinnamon spice Instant coffee Ants	
Results Result: After the testing I have found out that many kinds of natural or non-killing agents and repellents are in the world. For example baby powder can be used as an effective repellent to ward off ants.	
Conclusions/Discussion Conclusion: In the world there are many types of natural or non- killing agents, which can be used as household repellents without harming the ants in any way. This is very important because if you don't have these helpful little critters, the earth's ecosystem will become unbalanced, and it will eventually harm us too.	
Summary Statement As a young environmentalist concerned with the preservation of our ecological habitats, I focused my inquiry on the use of natural substances as a safe, cost- effective, to minimize pollution while protecting our planet from toxic abuses.	
Help Received Uncle John taught me how to make the charts and graphs. Dad developed the idea of the maze. Mother helped cut and glue pictures on the board. Mrs. Denenny helped proof read and edit my papers.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Christina A. Sun	Project Number J1923
Project Title Salinity on the Hatching Rate of Brine Shrimp	
Objectives/Goals I am investigating the effect of salinity on the hatching rate of brine shrimp. I hypothesized that the highest population of hatched brine shrimp nauplii would occur at 33 parts per thousand (ppt), the second highest population at 120 ppt, and the lowest population at 15 ppt.	
Abstract Methods/Materials A brief procedure of the experiment is as follows: Set up aeration and heating system in three containers of fresh water. Add salt to each container, composing solutions of 15 ppt, 33 ppt, and 120 ppt. Stir 3g of decapsulated brine shrimp nauplii cysts into each container. Let the mixtures sit for 24 hours. For each container, dilute samples and multiply the number of hatched nauplii by the amount of dilutions for an approximation of hatched nauplii. Record data. Repeat trial four more times.	
Results The average results for each salinity are as follows: The 15 ppt had an average population of about 353,700. The 33 ppt had an average population of about 240,900. The 120 ppt had an average population of about 6,000. The 15 ppt continually yielded the highest nauplii population of all three salinities, while the 120 ppt continually yielded the lowest population of nauplii.	
Conclusions/Discussion The results of the experiment did not support my hypothesis. On an average, the nauplii population was highest at 15 ppt, second highest at 33 ppt, and lowest at 120 ppt. This shows that the strain of nauplii cysts I utilized was familiar with a lower salinity than that of typical seawater salinity and the Great Salt Lake, Utah's salinity.	
Summary Statement I am investigating the effect of salinity on the hatching rate of brine shrimp to recognize which salinity yields a higher population of brine shrimp.	
Help Received Used equipment at Cabrillo Marine Aquarium's Aquatic Nursery under the supervision of Kiersten Darrow and Cora Webber; Father helped design display board.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Evin R. Wieser	Project Number J1924
Project Title A New Use for an Old Product: Investigating Milorganite as a Deer Repellent	
Objectives/Goals Problem: To find an effective, safe, long lasting, low cost, and easy to use deer repellent for common flowering plants in the Santa Cruz Mountains.	
Abstract Methods/Materials Experiment 1: Choosing a plant to test Violas, Dianthus, Stock flowers, Primroses, and Roses were tested to see which plants the deer preferred. Experiment 2: Testing Milorganite Four groups were compared-roses with Milorganite, roses without Milorganite (control), stock flowers with Milorganite, and stock flowers without Milorganite (control). Experiment 3: Determining how often Milorganite needs to be applied Milorganite was applied to rose plants weekly, every 2 weeks, and monthly, and compared to controls. Experiment 4: Garden Field Study Milorganite was applied monthly to our gardens for 18 weeks	
Results Experiment 1: The deer ate 100% of the rose flowers and 80% of the stock flowers, but 0% of the others. Experiment 2: The deer ate 100% of the rose controls and 50% of the stock controls. The deer ate 0% of the flowers in the groups with Milorganite. Experiment 3: The deer ate 100% of the control flowers but ate 0% of the test flowers of the weekly, biweekly, and monthly Milorganite groups. Experiment 4: Their has been no sign of deer damage in our gardens for 18 weeks.	
Conclusions/Discussion In Experiment 1, I found that deer liked roses and stock flowers and they were chosen as the test plants. In Experiment 2, Milorganite was effective at repelling deer from the test plants for two weeks even after rain. Presence of deer was confirmed. In Experiment 3, Milorganite was effective at repelling deer from the test plants for at least four weeks after one application even after periods of rain. Presence of deer was confirmed. In Experiment 4, monthly application of Milorganite has been effective in our garden for 18 weeks so far. The student's paired t-test showed that the results were significant. My neighbors, my science teacher, and my school science fair judge are now using Milorganite in their gardens to repel deer.	
Summary Statement My research showed that Milorganite is an effective deer repellent for the Santa Cruz Mountain area and is safe, long lasting, low cost, and easy to use.	
Help Received Mrs. Siegrist taught how to make a spreadsheet. My mother bought the materials I needed, gave me advice on the scientific method and using statistics, and she worked with me to help type and organize my board.	



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Emily A. Zisser	Project Number J1925
Project Title Is This the Secret to Less Expensive Poultry?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to determine whether it is necessary to rotate various types of bird eggs to achieve a high hatch rate or whether rotating eggs is an unnecessary and costly expense. The goal of this experiment is to save the breeders money on hatching poultry so that the cost of poultry could be lower.</p> <p>Methods/Materials In this experiment various types of bird eggs were incubated until they hatched. 116 Corturnix Quail, 18 Button Quail and 24 Chicken eggs were used in the experiment. The eggs were divided into two groups and put into two separate but identical incubators, one group of eggs was to be rotated as a control group and one not to be rotated. A thermometer was placed into each incubator to make sure that the temperatures in the incubators were the same. After the eggs hatched the chicks were left to rest in the incubator until they were dry and then they were put into a brooder with food, water and a light to keep warm.</p> <p>Results This experiment established that rotating eggs does help to achieve a higher hatching rate. The results of this experiment with the Corturnix Quail were, 20% of the eggs hatched when they were rotated and 12% of the eggs hatched when they were not rotated. The results for the Button Quail were 67% of the eggs hatched when they were rotated and 56% of the eggs hatched when they were not rotated. The results of the Chickens were that 58% of the eggs hatched when they were rotated and 25% of the eggs hatched when they were not rotated.</p> <p>Conclusions/Discussion This experiment has proven that rotating eggs during the incubation period does help the eggs to have a higher hatching rate. Although breeders are spending significantly more money on rotating the eggs, they are getting a significantly higher hatch rate to offset that cost. Each breeders particular costs of rotating the eggs, determines whether or not this is a cost-saving option for him or her.</p>	
Summary Statement My project is to determine whether we can effect the cost of poultry by leaving out an expensive step in the incubation phase of raising poultry.	
Help Received	