



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Sophia-Annette L. Hathaway	Project Number J2201
Project Title Is Half Better Than Whole?	
Abstract Objectives/Goals The project was to determine if the BHmax of a magnet would affect the regeneration of planarian. It was thought the magnet would not have any effect. Methods/Materials Fifteen Planarian, twenty-five Petri dishes, and pond water were all put together. Then ten of the planarian were bisected and put into the Petri dishes under the specific label (No Magnet, No Magnet (bisected), BHmax 52, BHmax 42, and BHmax 38). The planarians were then measured every day for thirteen days. Results The planarian with no magnet grew more in the thirteen day period and the planarian with BHmax 42 grew the least in the thirteen day period. Conclusions/Discussion The conclusion is that magnets had little effect on the planarian. The planarians that were bisected actually took longer to grow then the one that was not but the magnets still did not affect the regeneration. This expands the human knowledge to knowing how to regenerate and if people are capable.	
Summary Statement Exposing planarian to different BHmax and observing their growth rate.	
Help Received Mother bought materials;Mrs. Hoffman had guidelines; Ms. Flynn helped through the process.	



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Katherine A. Houk	Project Number J2202
Project Title Correlation of Owl Limpet Population to Algae Species Distribution	
Abstract Objectives/Goals In my project I wanted to discover if Owl Limpets tend to live in close proximity with a specific species of algae. I also was interested in seeing if the females feed on a different species of algae than the non-territorial male Owl Limpets. I hypothesized that the male and female Owl Limpets would live in close proximity with different species of algae because the female and male Owl Limpets are located in different regions of the tide pools. Methods/Materials For my project, I used eight 2500 cm square quadrats which I laid down in vertical transects with each quadrat 5 meters apart. I documented detailed descriptions of 600 grid samples I recorded the temperature of the ocean water, the air, and the sand. I documented all of the Owl Limpets, algae species, and other invertebrates in the transect and took photographs of each quadrat. I measured the owl limpets in mm and took detailed notes on the surrounding organisms and recorded all the algae species in the quadrat. I repeated my procedures on multiple days. I documented 24 quadrats in three transects and found 114 owl limpets of varied size and age. Results The 114 Owl Limpets I observed were mainly dwelling in the high-tide and mid-tide zones. I found that Owl Limpets with a shell length of greater than 40 mm were generally dwelling in the three deepest of the quadrats in all of the transects. Both male and female Owl Limpets resided near Mastocarpus, Tar Spot Algae. Female Owl Limpets tended to live in close proximity with Rockweed (Elvetia) which increased in density from 25.9% near males to 47.3% of the surface area where females were. Encrusting Coralline Algae density increased from 24.8% to 51.3% of the surface area where males resided. Conclusions/Discussion The 114 Owl Limpets I observed were mainly dwelling in the high-tide and mid-tide zones. I found that Owl Limpets with a shell length of greater than 40 mm were generally dwelling in the three deepest of the quadrats in all of the transects. Both male and female Owl Limpets resided near Mastocarpus, Tar Spot Algae. Female Owl Limpets tended to live in close proximity with Rockweed (Elvetia) which increased in density from 25.9% near males to 47.3% of the surface area where females were. Encrusting Coralline Algae density increased from 24.8% to 51.3% of the surface area where males resided.	
Summary Statement This project explored whether male and female Owl Limpets might live in close proximity with different species of algae.	
Help Received Thank you to my father who supervised me at the tide pools. Thanks to my science teacher who lent me equipment and provided scientific guidance.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Melina Ives; Greta Van Herpe	Project Number J2203
Project Title Shellfish: Nature's Water Filter	
Objectives/Goals The objective of our experiment is to determine which of three shellfish species (mussels, clams, and oysters) filter bay water for food the fastest. We believe that the mussels will filter the water faster than the oysters and clams because the mass of the animal inside the shell is larger than that of the oysters and clams.	
Abstract	
Methods/Materials We used four 10 gallon tanks, algae, filtered bay water, 8 Pacific oyster, 23 mussels, and 23 clams. We placed oysters, clams, and mussels each in separate tanks (the fourth tank was the control tank). We put 2 ml of concentrated Nannochloropsis algae into each of the four tanks and visually monitored the clarity of the water over the next 24 hours using secchi discs.	
Results Our experiment produced differing results when repeated. After eight hours, the first experiment showed that the clams filtered the water fastest. The mussels were next fastest and the oysters were slowest. An interesting thing happened during the first experiment: the mussels spawned in their tank which added to the murkiness of their water. In the second experiment the clearance rate of the mussels was faster than the other mollusks. The mussels did not spawn during the second experiment.	
Conclusions/Discussion Our conclusion is that mussels are the fastest at filtering water. If they had not spawned during the first experiment, we feel they probably would have consistently been the fastest. The oysters, by comparison, were the least efficient animal during both experiments.	
Summary Statement Demonstrate the filtering ability of three species of shellfish and their ecological benefits.	
Help Received Parental help with photography, animal and water collection, and experiment set up.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Sawyer Koenig; Sydney Koenig	Project Number J2205
Project Title Can We Affect the Hatch Rate by Audio Stimulation?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals If you add the audio stimulation of a hen(s) clucking to incubating eggs you will have an increase in the hatch rate verses either eggs incubated in silence or eggs incubated with ambient noise.</p> <p>Methods/Materials Our materials included the eggs (99), incubators (3), and audio players (2) to play the audio stimulation. We gathered the eggs from the breeds of chickens we wanted to have chicks from, then we added an equal number of each breed's eggs to the incubators and rolled the eggs three times each day until day 19. We recorded the chicken sounds from our chicken barn and started playing it every day for the last ten days of the experiment, we also added the music stimulation to another incubator for the last ten days. We recorded the hatching results from each incubator and calculated the hatch rate for each incubator.</p> <p>Results Our experiment was a success. We discovered that the music stimulated eggs were the first to hatch and had the highest hatch rate of 74%. The eggs stimulated with a recording of chickens clucking hatched second and had a hatch rate of 70%. Our control incubator with no stimulation only resulted in a 27% hatch rate.</p> <p>Conclusions/Discussion After our experiment we conclude that both the audio stimulation types improved the hatch rates of our chicken eggs. We also feel the fact that both stimulated incubators started hatching before the non-stimulated incubator is also proof that our hypothesis was correct.</p>	
Summary Statement Can we get more eggs to hatch by playing chicken sounds next to the incubators during days 12 to 21.	
Help Received Mother helped type the report, Dr. Fetherston supervised our experiment, Dad helped us collect eggs and set up incubators.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Samuel Z. Lang	Project Number J2206
Project Title A Comparison of the Effects of Household Wastes vs. Commercial Bedding in Vermiculture on <i>E. fetida</i> and <i>L. rubellus</i>	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals When you start raising worms, which food / bedding should you choose? According to many online articles, worms can be fed on many things including paper, coffee and tea. By using pure food as bedding, I studied the effects of common household wastes vs. commercial bedding in vermiculture on <i>E. fetida</i> and <i>L. rubellus</i>, in order to find out which household wastes preserves as well as encourages the most worm growth. My hypothesis is: peat moss would be most effective in both preserving vitality and promoting growth, but inexpensive alternative(s) could be found in the Household Wastes category.</p> <p>Methods/Materials Putting worms into a variety of pure food jars (no other bedding) over a period of time, observing worms# health condition, and measuring their weight changes. Tested foods: pea moss, shredded paper, coffee grounds, used tea leaves, and etc. Tested worm species: <i>Eisenia fetida</i> and <i>Lumbricus rubellus</i>.</p> <p>Results Peat moss produced the best results, with paper finishing closely behind; then followed by coffee, teas were the worst.</p> <p>Conclusions/Discussion The pilot study supported my hypothesis that peat moss would be most effective in both preserving vitality and promoting growth, but inexpensive alternative(s) does exist in the Household Wastes category, such as shredded paper. In addition, I learned that moisture is a powerful variable, and teas may be potential worm poison.</p>	
Summary Statement By raising worms in variety of pure foods, I conducted this project to compare the effects of household wastes vs. commercial bedding in vermiculture on <i>E. fetida</i> and <i>L. rubellus</i> .	
Help Received Parents provided moral support , advice and purchase of all materials.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Emily J. Mannarelli	Project Number J2207
Project Title Pill Bugs vs. Magnetic Fields	
Abstract Objectives/Goals My objective was to determine how magnetic fields affect the behavior of pill bugs. Methods/Materials 6 shoe boxes were filled with 1/2 inch of soil, and separated into 3 equal sections using white string. At one end of 5 of the 6 shoe boxes, a bar magnet is attached to one end. No magnet is used for the sixth box, which is the "Control" box. 21 pill bugs are then placed in the middle section of each box. Their location and behavior is recorded immediately. Observations are conducted every day for 4 days, recording the locations and behavior of the pill bugs in relation to the bar magnet. Results After the 4 day period, 4 of the 5 boxes resulted with all 21 pill bugs being in the front section closest to the magnet. Only the 5th box deviated from these results, along with the control box. Conclusions/Discussion After 4 days, the collected data inferred that my pill bugs were attracted to the magnet, as 4 of the 5 boxes with magnets ended the 4 day period with all 21 pill bugs locating to the front section closest to the magnet.	
Summary Statement How magnetic fields affect the behavior of pill bugs.	
Help Received My mom helped me set up the shoe boxes. My dad helped me organize the data into graphs.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Leah E. Neverov	Project Number J2208
Project Title Pigeon Development: A Comparison of the Difference in Growth of Baby Pigeons, Human Care vs. Natural Parent Care	
Abstract Objectives/Goals What is the difference between pigeon care and human care? I believe that pigeons taken care of by their parents will be at least 25% bigger and will start flying and eating on their own about two weeks earlier than the pigeons taken care of by humans, because of the nutrients that the hatchlings receive from their parents and by watching their parents to learn how to fly and to eat. The objective is to compare the difference in baby pigeons taken care of by their natural parents verses humans. Methods/Materials I have five nests with two eggs each, I took one sibling from each nest after they hatched, and took care of the five while the other five stayed with their parents. Their growth in weight, feather growth, and abilities to fly and to eat by themselves were recorded. Materials used: - Kaytee, exact hand feeding formula - Two syringes - Fine Feathers bird food - Water - Mallard Creek Shavings - Heating Lamp - Lizard heating pad - Cage - Gravel Results Pigeons taken care of by their parents grew faster and healthier than the pigeons taken care of by me. They also started to eat by themselves and to fly about 2 - 4 weeks sooner than the pigeons taken care of by me. Conclusions/Discussion According to my results the difference in growth did not stay the same as stated in my hypothesis. The Human Care pigeons are only growing more slowly. My research leans towards that the human care pigeons will not be stunted for life, and eventually will catch up with the pigeons taken care of by their parents. This helps people who take care of pigeons to know the best care possible.	
Summary Statement This project compares the development of baby pigeons under the care of their natural parents verses human care.	
Help Received Mom helped organize the binder and dad supervised the experiment (taught me how to feed the birds properly, etc.)	



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Shea R. Nolan	Project Number J2209
Project Title Who Are You Calling Bird Brain?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to investigate the intelligence of Steller's Jays (<i>Cyanocitta stelleri</i>) and Western Scrub Jays (<i>Aphelocoma californica</i>) by determining if they could use simple problem-solving skills by manipulating a string to obtain food.</p> <p>Methods/Materials Small chunks of food were tied to the ends of three strings, the food varying from chunks of bread to donut-shaped biscuits. Another string had the control, which was a red rubber cap. The strings were then tied to a bike rack, which was suspended from a tree limb in mid air. At the beginning of the experiment, the strings were 17, 22, and 25 inches, and the control hung from a 22-inch string. Later, however, the strings were shortened to 18, 14, and 10 inches, and the control was shortened to 18 inches. The Trip Camera was then set up, attached to a tree limb adjacent to the bike rack. Four bungee cords and four twist-ties were used to strap it to the tree limb. The camera was set to take a picture every 30 seconds when it sensed movement in the area. Last, a plate of #bait# was placed on the top of the bike rack to attract the birds, again the food varying from bread and acorns to biscuits. The experiment commenced for nine weeks. Every week the camera was taken down to view the pictures that had been taken. During winter break, the bird's behavior was observed in real time, with observations of the metal structure taken for up to three hours a day, between the hours of 8 AM and 1 PM. I sat in a parked car, where the birds could not see me, and observed their comings and goings.</p> <p>Results The birds went from ignoring the experiment to using the experiment as a food source. Both species showed an interest in the strings, but only the Scrub Jays went as far as trying to obtain the food on the ends of them. Only once I observed a Scrub Jay take the suspended food, though it's possible other attempts were made, but not observed.</p> <p>Conclusions/Discussion My hypothesis was both correct and incorrect. It was incorrect for Steller's Jays, who did not demonstrate problem-solving skills for this purpose. But it was correct for Scrub Jays, but statistically inconclusive, based on the evidence of a single observation of a bird swooping down and pulling the food up.</p>	
Summary Statement My project investigates the intelligence of Scrub and Steller's Jays in their natural habitat, and whether they can solve a simple problem to acquire food.	
Help Received Father helped suspend experiment, mother helped with proofreading.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Taylor M. Pannell	Project Number J2210
Project Title Got Carrots? Does Adding Carrot to the Water Affect Hatching Rates of Triops longicaudatus?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals For many living creatures, conditions have to be just right for hatching. I investigated hatching conditions for Triops longicaudatus, namely whether placing plant matter (carrot) in spring water with Triops eggs would improve hatching rates. It was suggested in the literature that adding a slice of carrot would be beneficial. Of 3 groups, one with carrot slivers, one with turnip slivers (as a root vegetable similar to carrot), and one with no additive, it was predicted that the carrot group would produce the highest hatching rate.</p> <p>Methods/Materials 30 Triops eggs each were placed in three glass fish bowls containing 450 ml of Arrowhead spring water warmed to the temperature of 78 degrees Fahrenheit by desk lamps. One bowl contained 5 carrot shavings; the second bowl contained 5 turnip shavings; with the third receiving nothing. My prediction was that more larvae would hatch in the bowl with carrot. Four separate 24-hour trials were conducted.</p> <p>Results In four 24-hour trials, the bowls with plain spring water yielded the most larvae (averaging 4), with carrot coming in second (2.5), and turnip yielding the very least (1), therefore failing to support my hypothesis.</p> <p>Conclusions/Discussion Perhaps too much matter was added or the temperature was kept too high, negating any positive effect of the nutrients of the carrot (if any truly exist). My results can possibly be explained by osmotic inhibition, wherein hatching is suppressed because of high mineral and organic content in the water; indicating a hostile environment for survival and reproduction; such as an old pool about to dry up instead of a fresh new pool with few predators.</p>	
Summary Statement Does Adding Carrot to the Water Affect Hatching Rates of Triops longicaudatus?	
Help Received dad helped with photography, mother helped trim and affix items to project board	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Jamie L. Ryan	Project Number J2211
Project Title Does Sugar Affect a Mealworm's Weight?	
Abstract Objectives/Goals The objective is to determine if sugar will affect the weight of mealworms. Methods/Materials Prepare 16 containers with a cup of oats and ¼ of a potato. Separate the 16 containers into four groups. In all the containers, gently lay ten worms. The first groups label as the control group. Label each container A, B, C, or D without repeating letters. Add the varying amounts of sugar to the containers and label. Weigh worms at appropriate times and record data in log book. Repeat the process daily for the total allotted time. Results The group of mealworms without sugar reached an average weight of 0.5 grams per worm on days 10 through 13. The group of mealworms with 2T of sugar reached an average weight of 0.5 grams per worm on days eight and nine. The group of mealworms with 4T of sugar reached 0.7 grams per worm on day 13. The group of mealworms with 6T of sugar reached an average weight of 0.5 grams per worm on days 11 through 13. Conclusions/Discussion The conclusion of this project was that 4T of sugar reached the greatest weight per worm. My hypothesis was correct because 4T of sugar did increase the weight of the mealworms. Two tablespoons of sugar wasn't enough sugar to make an impact on the worm's weight. Six tablespoons of sugar was too much sugar for the worm's diet. So if you needed to gut load your mealworms, to feed your livestock or even to enjoy yourself, then it would be a smart decision to add sugar to the worm's diet before it is consumed.	
Summary Statement The project will determine if different amounts of sugar will affect mealworms weight.	
Help Received none	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Kashan H. Saeed	Project Number J2212
Project Title Nature Is Always Right	
Abstract Objectives/Goals This project was designed to discover the seed color preferences of cockatiels. My hypothesis was that color of seeds will not affect the amount eaten by birds. Methods/Materials I needed seeds, food colors, bowls, and birds. I colored the seeds red, green, and blue. Once colored, I weighed them and placed them in a bowl. I also placed same amount of uncolored seeds into a bowl. These seed bowls were placed into the cage for 12 hours a day for 8 days. Each day, I recorded the weight of bird seed which was eaten. Results . I found out that birds ate normal (uncolored) seeds more than the colored (uncolored 13.14 grams per day vs. 13.06 grams per day of red, 12.09 grams per day of green and 10.68 grams per day of blue seed). Conclusions/Discussion I concluded that my Hypothesis was incorrect as the birds ate more from the normal color seeds. This could be because birds have learned to eat certain type of seed and are reluctant to eat seeds which are different than their normal seeds.	
Summary Statement You can not change the basic instincts of birds	
Help Received My mom and dad helped me in getting the materials and setting up the poster	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Rory R. Sawey	Project Number J2213
Project Title Hermit Crabs: More Than Meets the Eye	
Objectives/Goals My experiment was to find out if hermit crabs have a color preference.	
Abstract Methods/Materials Hermit crabs are nocturnal. During the day they seek shelter from the light. They find shade by burrowing and/or finding shelter. I used this behavior to help determine their color preference. For my experiment I set up an opaque rectangular box and put 4 hermit crab huts of different colors in each corner of the box. I used 4 land hermit crabs. I put one crab in at a time. Every test I put the crabs in the same order. I recorded what huts each crab went to and the order they did it in. I gave each hermit crab 5 minutes in the box. After each of the 4 hermit crabs had gone in the box once, I rotated the box to change the location of the colored huts. I then put the 4 hermit crabs back in the box one at a time in the same order. The materials I used were 1 opaque rectangular box, 4 living land hermit crabs, 4 different colored huts of the same design, 1 white rectangular tray and 8 paper towels.	
Results I observed that the hermit crabs went to the white or blue colored crab huts on their first or second visit a majority of the time. I also observed that almost all of the time the hermit crabs went east when moving toward their first or second hut. The crabs appeared to follow each others trail in three out of four tests.	
Conclusions/Discussion My experiment was inconclusive because it appeared that another instinct took precedence. Hermit crabs may have a preference for white or blue colored huts. However, the crabs initially moved to huts in the east direction a majority of the time. It is possible this was due to a sense of direction or smell by following each others trail. I learned a lot from this and it was fun.	
Summary Statement The purpose of my project is to find out if a hermit crab has a color preference.	
Help Received Mother helped set up the experiment layout. Mother helped type report as I dictated what to write.	



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Carina W. Schipper	Project Number J2214
Project Title The Effect of Heat on Eisenia fetida's Reproduction	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I studied the effect of heat on Eisenia Fetida (also know as redworms) to find the temperature in which they reproduce best in. I predicted that Ensenia Fetida would reproduce best in the warmest temperature, because they are more active in heat.</p> <p>Methods/Materials Over the course of 5 weeks, I counted the number of new worms in 4 diffrent containers (A, B, C and D). "A" was set at outside tempurature, "B" was put on a heater set at 70 degrees Farenheit, "C" was set a 75 degrees and "D" was kept at 80 degrees. Each container had 15 worms, a thermometer, and 1 pound of compost in it. Once transferred into their containers, the worms were given 1 week to ajust to their new environments. After the first week, I counted the number of worms and subtracted 15 from the total to see how many new worms there were. I used the worms from my brother's "Can-o-Worms" which he has had for over a year. For my containers I used four 5x5x3 tupperware containers, as suggeted by J. Michael Thompson, an annelid expert. I also chose not to use any temperature over 80 degrees because Patricia Lauber, author of "Earthworms:Underground Farmers" says anything over 83 degrees is harmful to the worms.</p> <p>Results The reproduction rate of container A was 3 cocoons (each containing 3-5 worms) per week. COnainer B was slightly higher at 5 cocoons per week and container C was higher yet at 11 cocoons per week. Container D however had a low 1 cocoon per week. The worms in A acted normally and stayed in the middle of the container. Worms in B resided in the top and the bottom of the container and the worms in C were very active and were constantly moving throughout the container. The worms in D seemed to stay at the top of the container, as if to stay away from the heater.</p> <p>Conclusions/Discussion The data I collected through my expirement did support my hypothesis, but only to an extent. Heat does increase Einsenias reproduction, but once the heat goes to 80 degrees Farenheit, the worms go into a coma-like state like the worms in container D. However, once removed from the heat, the worms went back to their normal behavior. Therefore, I am led to believe the heat was too intense for the worms. The result of my experiment is such: 77 degrees Farenheit is the optimal temperature for Einsenias Fetida, and any tempurature 80 degrees or over is too much for them to handle.</p>	
Summary Statement I studied how heat effects Einsenias Fetidas reproduction.	
Help Received Teacher advised on how to communicate results	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Walter Z. Su	Project Number J2215
Project Title What Material Attracts the Most Flies?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal is to find the material that attracts the most flies.</p> <p>Methods/Materials In order to determine the attractions of house flies to certain materials potentially used for fly bait development, a portable and efficient test system was developed for the first time. Flies were provided with the choices of various organic matters which can usually be found in urban residential areas, except rotten chicken liver which mainly stands for dead animals.</p> <p>Results It was found that rotten fruits attracted the most flies as compared with other materials tested.</p> <p>Conclusions/Discussion House flies play an important role in disease transmission by feeding on microbial sources from their habitats. Disease agents could also travel with flies if they get stuck on their limbs and other body parts, so fly control is significantly necessary. House flies like to eat rotten fruits and feces, or anything with decaying matters, carbohydrates, and microbes. In this project, rotten fruits attracted the most flies and good to be used for fly bait.</p>	
Summary Statement This project will identify which material attracts the most flies and potentially good to be used for fly bait in fly control.	
Help Received Air pump and air vacuum system were supplied by Dr. Alec Gerry's lab, Department of Entomology, UC Riverside.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Darin Truong	Project Number J2216
Project Title Pure Silk: Does Electromagnetic Radiation Affect a Silkworm's Ability to Effectively Spin a Cocoon?	
Abstract Objectives/Goals The objective is to determine whether or not low level electromagnetic radiation affects the time taken for a silkworm to spin a cocoon. Methods/Materials Small silkworms ordered from a supply company were raised to spinning state in a storage container. As each silkworm started to spin a cocoon, it was separated into an individual 5.5 ounce soufflé cup. The time and date for the start time was recorded. The silkworms were observed every day, and when the cocoon was completely opaque, the time and date was recorded as the stop time. Results The times recorded somewhat reflected the hypothesis, but not as much as originally hypothesized. The silkworms that were exposed to low level electromagnetic radiation took somewhat longer than the control group to spin a cocoon. The average elapsed spinning time of the control group was 64 hours 52 minutes, and the average time for the electromagnetic radiation group was 81 hours 10 minutes, a 16 hour 18 minute difference. It was observed that when initially relocated to the source of electromagnetic radiation, the silkworms either stopped spinning or spun all over the container, as opposed to the normal figure 8 pattern. Conclusions/Discussion The control group silkworms spun cocoons somewhat faster than the EMF group. It was originally hypothesized that the EMF group would spin 50% faster than the control group. Though the results showed that the EMF group took longer than the control group to spin, the difference from the control group was only 25%. Overall, the EMF group took longer, but the electromagnetic radiation had only a minimal effect on the silkworms.	
Summary Statement Electromagnetic radiation affects a silkworm's time taken to spin a cocoon, but the effects are minimal, and are not very harmful in any way.	
Help Received Mother bought all the necessary supplies; father helped take photos; science teacher helped edit papers	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Esmeralda Velasquez	Project Number J2217
Project Title Grouped or Crossed Breeding: What Is the Effect on Snail Reproduction and Maturation?	
Objectives/Goals This project analyzes the egg count and maturation time of the hermaphroditic snail <i>Lymnaea stagnalis</i> in cross-bred and grouped populations. My hypothesis was that cross-bred snails would produce more eggs than group-raised snails. I further hypothesized that maturation data would show larger, more numerous eggs for the snails in the cross-bred bowls.	
Abstract Methods/Materials Snails were gathered from four separate demes (isolated ponds) from a local pond area. Snails were housed in bowls according to their rearing group--this established the group deme. Crossed bowls were set up by putting one snail from each deme with one from another, resulting in six crossed pairs. Data was collected on number of eggs laid. Four different project periods were analyzed, using fresh snails at each set up.	
Results Combined data show that crossed snails laid 4.43 eggs per observation period while grouped snails laid 2.73 eggs per observation period. Trial data showed that one grouped deme mated far more within its rearing group than when crossed. The deme that least preferred to mate within their group laid almost four times as many eggs when crossed. Data regarding egg maturation can only be reported by the number of days to mature; grouped snails matured sooner than crossed snails.	
Conclusions/Discussion My hypothesis was right regarding crossed snails laying more eggs. I discovered that had I not taken a wide variety of snail demes into my study, I would not have made this same conclusion as one deme reproduced exactly opposite to that of the other three. Overall, I believe that snails prefer to reproduce with novel (crossed) partners more due to research on sperm competition and natural selection. Additionally, the production of sperm is energy costly to snails, so they discriminate partners through the use of allohormones. My hypothesis on egg maturation was not conclusive. I had not clearly planned the methodology on how to measure for egg size, and egg maturation into viable snails became too cumbersome to manage accurately.	
Summary Statement This project analyzes the egg count and maturation time of the hermaphroditic snail <i>Lymnaea stagnalis</i> in cross-bred and grouped populations.	
Help Received Teacher as facilitator; Dr. Joris Koene (University of Amsterdam) as email support.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Grace C.S. Wainscoat	Project Number J2218
Project Title Deep Sea Jaws	
Objectives/Goals This experiment focuses on the mouth morphology of four different deep-sea fish, two of which engage in vertical migration, and two of which who do not. In this experiment, I will be measuring the jaw length of several different deep sea fishes. My hypothesis is that deep sea fishes who do not engage in vertical migration have jaw lengths that are greater in proportion to their bodies compared to deep sea fish who do engage in vertical migration.	
Abstract Methods/Materials Step 1: set out dissecting tray and materials Step 2: put on gloves Step 3: open first jar of fish Step 4: take one fish out carefully with tweezers Step 5: use the millimeter side of caliper to measure standard length of fish Step 6: record the measurements in notebook Step 7: use millimeter side of caliper to measure jaw length of the fish Step 8: Repeat steps 4-7 for remaining samples of that species. Step 9: repeat steps 3-8 for each type of fish in the order: 1. Stenobranchius leucopsaurus, 2. Cyclothone acclinidens, 3. Serrivormeridae sector, 4. Anoplaster cornota.	
Results My results supported by hypothesis that deep sea fish who do not engage in vertical migration have larger jaw lengths in percentage to their body lengths, than fish who do. The two fish who did not engage in vertical migration did have larger jaws while the two fish who did had smaller jaws. However, one fish who engaged in vertical migration and one fish who did not, have similar jaw sizes. That is why I would measure and study more fish for my results to be even more valid.	
Conclusions/Discussion Evaluating the evidence and measurements in my experiment supports the hypothesis that deep sea fish who do not engage in vertical migration tend to have jaw lengths that are greater in proportion to their bodies compared to deep sea fish who do engage in vertical migration. There is enough data to support my hypothesis, however more research and experiments might better support it. This experiment would be stronger if additional fish species from higher waters were also measured. It would allow comparisons of the jaw length of fish that live in an environment where food is abundant to the jaw length of the deep sea fish that were used in this experiment. In addition, the results would be	
Summary Statement This experiment focuses on the mouth morphology of four different deep-sea fish and what causes these adaptations.	
Help Received My teacher acquired the fish used in the procedure and my father measure fish and glue my board.	



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Kimberly R. Wright	Project Number J2219
Project Title When Put to the Test, Which Birds' Feet Are Best?	
Objectives/Goals Abstract <p>At the beginning of my project I had a clear idea of what I thought would happen. I believed that the duck feet would swim the fastest because they use their feet the most. However, after all my testing I found that it wasn't because they use their feet the most, but because they don't have as large of a gap in between their toes. Overall, my hypothesis was correct by answering the problem of, which bird's feet swam the fastest, but my theory was incorrect.</p> <p>When I did the testing for this project, there were some struggles along the way that I didn't account for when I first started. Luckily, I had people there to help me control my test and make sure everything was safe. For example, I had to make my technique the same, so when I had different flippers on, the times wouldn't change because of my own swimming, but because of the different style of the flippers. I also made sure I was safe at all times when doing the testing, by having an adult near the pool. Furthermore, I wore a wetsuit to insulate my body from the cold water, similar to how a ducks flipper can keep itself warm even in freezing water.</p> <p>After completing 25 laps with each style of flipper, I have concluded that the duck's flipper swam the fastest, the Penguin's flipper came in second, the Grebe's flipper came in third, and the Non-swimming bird came in last.</p>	
Summary Statement <p>My project is about which bird feet can swim the fastest in water.</p>	
Help Received <p>Mother helped time my swimming; Teacher helped teach how to write papers.</p>	



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Kasi P. Zoldoske	Project Number J2220
Project Title Effect of Selenium-Enriched Feed on Chicken Eggs	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine if feeding my chickens selenium-enriched mustard meal would significantly increase the amount of available selenium in the hen's eggs when compared to commercially available feed.</p> <p>Methods/Materials I started my research by evaluating the selenium level in eggs laid by my nine chickens that had been fed a diet of commercially available feed "scratch" for a period of 90 days. This is my control for this experiment. I began my treatment over a period of 7 days, where I gradually increased the amount of selenium-enriched mustard meal, while also reducing the amount of commercial feed in their diet. I continued until the chickens were eating a diet of 100% mustard meal. The chicken eggs were evaluated for selenium levels under control conditions (commercial feed), during transition to mustard meal, and during the treatment period of 33 days. Materials: Commercially purchased chicken feed "scratch"; Selenium enriched mustard meal; Nine chicken hens; Chicken coop; Scale; Access to analytical laboratory (selenium measurement); Artificial light, and Paper and pencil.</p> <p>Results The data showed increased selenium levels in both the egg whites and egg yolks with chicken eggs produced on a diet of mustard meal. The selenium levels were highest in the egg yolks. This was expected due to the higher protein levels found in the yolk. The selenium levels were up to 54% higher in the egg yolks produced with a diet of selenium-enriched mustard meal over those fed commercial feed.</p> <p>Conclusions/Discussion My research shows that the level of selenium can be significantly increased (50%) by feeding my hens a diet of selenium-enriched mustard meal. Research has shown that selenium is essential to human health. The Journal of the American Medical Association published results from a study done with 1,312 patients in 1996. The result from this cancer prevention trial was based on an intake of 200ug/day selenium or a placebo. The results reported a 50% decrease in total cancer incidence. If food can be produced naturally with increased levels of selenium, then we can eat fewer eggs and still ingest our daily requirement of selenium. The results from my experiment suggest we would need only four eggs produced with selenium-enriched feed, compared to seven eggs produced using commercial feeds for our daily requirements.</p>	
Summary Statement To significantly increase the selenium level in chicken eggs by changing the type of feed	
Help Received My mother helped with typing the report , Dr. Mike Thomas signed off on the project, and Dr. Gary Banuelos for testing the eggs	