



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Shara D. Cohn	Project Number S1901
Project Title Zooplankton Trophic Interactions at Eagle Lake, California as Determined by Nitrogen and Carbon Stable Isotopes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project is to determine the trophic interactions of zooplankton at Eagle Lake, California and demonstrate the inherent complexity of zooplanktonic interactions.</p> <p>Methods/Materials Zooplankton samples were collected with a plankton tow and Schlinger Trap monthly for two years at Eagle Lake, California. Both mixed and taxonomically separated samples of zooplankton were rinsed and dried for analysis of Nitrogen and Carbon Stable Isotopes. ANOVA statistics and bivariate analyses of Nitrogen and Carbon Stable Isotope ratios (N15/N14 and C13/C12) were used to determine zooplankton feeding interactions.</p> <p>Results Copepods were found to be one trophic level above daphnia during the early summer. At the same time, copepods were often found inside the egg-carrying brood chambers of the large daphnia morph. Copepods were found to be between trophic levels during the rest of the year. Leptadora fed on the highest trophic level throughout the entire course of the year. Daphnia fed consistently on the lowest trophic level. The copepod and large Daphnia pulicaria morph populations peaked in early summer. The smaller daphnia morph population peaked the following month. Arms of Eagle Lake, California demonstrated distinct Carbon ratios and day-to-day fluctuations of carbon ratios were identified while Nitrogen signatures remained constant.</p> <p>Conclusions/Discussion Copepods are, during the early summer, predated daphnia eggs. During the rest of the year, however, when the large morph is not so abundant, copepods are forced to eat between trophic levels. Because the large daphnia more is heavily predated, the smaller, less predated daphnia morph flourishes throughout most of the year. Leptadora are consistent carnivores while daphnia are consistent filter-feeders. The complexity of these trophic interactions demonstrates the significance of zooplankton in the food web. Each of the arms of the lake is identified as having distinct ecosystemic properties. However, winds on the lake cause masses of water, with distinct carbon signatures to move across the lake, creating carbon variability at constant sites within the lake. The presence of multiple basal carbon sources is a new consideration for stable isotope ecology and undermines the belief that constancy in diet equates constancy in carbon isotopic values.</p>	
Summary Statement This project determines the feeding relationships among lake zooplankton.	
Help Received Joan Druckman Cohn, Bruce Cohn, Mrs. Cindy Suchanek, Dr. Tom Suchanek, and Collin Eagles-Smith edited report; Used lab equipment at University of California, Davis under the supervision of Dr. Tom Suchanek; Dr. Tom Suchanek and Collin Eagles-Smith helped with protocol; Participant in Young	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Adam C. Currie	Project Number S1902
Project Title Electric Communication in African Mormyrid Fish	
Abstract Objectives/Goals The objective of my project was to find out how African elephant-nose (mormyrid) fish react to each other and to my artificial electrical stimulus through their electric organ discharge (EOD) signals. Methods/Materials I obtained two Peter's elephant-nose fish (<i>Gnathonemus petersi</i>) from a pet store and put them into a fish tank together. I sought to discover what happens to an elephant-nose's EOD frequency during (1) aggressive encounters with other fish and (2) stimulation with an artificial EOD signal (1 volt, 300 microsecond pulses) produced by an electronic stimulator. In one set of experiments I tested whether or not fish would respond to a series of low-frequency (0.2 Hz) artificial stimulus pulses by generating an echo. During an echo, fish respond 1:1 to some of the artificial stimulus pulses with a latency of about 8-10 milliseconds. I was able to elicit such responses. In a second set of experiments, I presented fish with short high-frequency trains of artificial stimulus pulses (5-50 Hz) in order to mimic the EOD buzz that these fish display during aggressive encounters with other fish of the same species. Results My results showed that fish responded to the artificial stimulus with two different behaviors also exhibited during encounters with other fish: echoes and buzzes. Weakly electric fish will respond to an artificial electrical stimulus as it would to the EOD of another fish. Fish only responded with an EOD buzz to specific patterns of artificial stimuli with pulse-frequencies and train-durations that were near those of real fish. Conclusions/Discussion My hypothesis was correct. Elephant-nose fish responded to an artificial electrical stimulus as they would to another fish. They even displayed physical aggression towards the stimulating electrodes in some cases, which I was able to videotape. The dominant fish reacted to stimulating electrodes as if they were another fish in its territory, and sometimes actually attacked the electrodes. I think the fish did that because the stimulating electrodes felt like another fish electrically.	
Summary Statement I recorded and described two types of electrical communication in weakly electric "elephant-nose" fish and showed that these fish will also respond to an artificial electrical stimulus as if it was another fish.	
Help Received Father acted as co-advisor with Dr. von der Emde. Used lab equipment at UC Riverside under my Father's direction.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Taylor M. Davis	Project Number S1903
Project Title A Study of How Fish Use Their Pectoral and Caudal Fins during Locomotion against a Current	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of the experiment was to determine how different aspects of a fish such as size, body shape, and fin design affect how a fish uses its pectoral and caudal fins when swimming against a current. It was predicted that the size of a fish would play the most impacting role in how much a fish must utilize its fins.</p> <p>Methods/Materials A self-constructed flow tank was used to create a one way current in an aquarium. Bala sharks, blue gouramies, and different varieties of goldfish were then individually placed into the aquarium and were filmed swimming against the current using a lateral and overhead view. The videotapes were then reviewed and the amount of times each fish moved their pectoral fin per second was counted as well as how greatly each fish moved their caudal fin.</p> <p>Results The bala sharks tested used the lowest amount of pectoral movements at an average of 1 fin movement per second. The fantail goldfish used the most pectoral fin movements of the fish tested with an average of 3.6 fin movements per second. It was also found that the small common feeder goldfish tested used the smallest caudal fin movements of 35 degrees and the small blue gourami tested used the largest caudal fin movements of 55 degrees.</p> <p>Conclusions/Discussion It was found that body shape and size, and fin design all play factors in how a fish utilizes its fins. Streamlined fish are able to use less fin movements than fish with laterally compressed or spherical bodies because their body shape reduces drag. Larger fish generally use less fin movements than smaller fish because the current pushes them less. Rigid fins allow for less fin movements than wavy fins because they cut through water more effectively.</p>	
Summary Statement The project studied how different varieties of fish use their fins while swimming against a current.	
Help Received My father helped me create my experimental set-up.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Janet B. Delfino	Project Number S1904
Project Title Communication Preference of Ravens (Corvus corax)	
Abstract Objectives/Goals Determine which method of communication Ravens prefer when attracting other ravens to sources of food, predators or mates. Methods/Materials Seven life-size Raven cardboard decoys and a digital sound recording of live birds are used individually and/or in combination to see which method attract the most ravens to a central study site. Results Many ravens can be attracted to a flock or central location using a combination of life size decoys and sound recordings. Conclusions/Discussion Using a combination of both raven decoys and sound recordings, one can create a situation or atmosphere to draw many birds to a central location for further research or even to draw birds away. In the case of California's desert tortoise, this technique may be useful to protect baby tortoises from hungry ravens.	
Summary Statement Discover if ravens (Corvus corax), when flocking, prefer sight, sound or a combination of both to attract other ravens.	
Help Received My father assisted in building decoys and in conducting the experiment; my youngest sister Chrystine helped with artwork; my other sister Chrysanta, helped with project display board and documentation.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Tucker J. DeYoung	Project Number S1905
Project Title Nest Box Preferences for Wood Ducks, Barn Owls, and Other Species	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal was to determine whether the distance from water that a wood duck nesting box is placed affects the type of species nesting in it. My hypothesis was that Wood Ducks tend to nest in boxes that are placed closer to water and other species tend to nest in boxes that are placed farther from water.</p> <p>Methods/Materials The materials used were wood duck nest boxes mounted as part of the California Wood Duck Program on a property in Placer County, CA. The methods used in this project were collecting data on the type of species nesting in the wood duck boxes, compiling data in a spread sheet, calculating the mean distance of the boxes used by different species to water, and evaluating the significance of different mean distances using the statistical t-test.</p> <p>Results The mean distances to water for boxes that were nested in by Wood Ducks, Barn Owls, and other species were 11.2 feet, 5.4 feet, and 43.7 feet, respectively. The results of the t-test show that there is a significant difference between the mean distance to water for boxes occupied by Wood Ducks compared to the mean distance to water for boxes occupied by Barn Owls and for boxes occupied by other species. The hypothesis is rejected with respect to barn owls and confirmed with respect to other species.</p> <p>Conclusions/Discussion The data seem to suggest that Barn Owls like to nest closest to water while Wood Ducks tend to nest slightly farther away. The other species appear to have the preference of nesting farther away from water compared to Wood Ducks. However, this conclusion is based on three years of data with very few data points for Barn Owls and other species. In the future, as more boxes are installed, there may be more available data which could help to counteract the small sample size for Barn Owls and other species and perhaps control some of the variance in the data.</p>	
Summary Statement Proximity to water was evaluated as a factor in nest box use by different species.	
Help Received Mother helped mount some photographs. Father provided research materials and editorial suggestions. Uncle advised on statistics test. Participant in California Wood Duck Program.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Eric T. Felix	Project Number S1906
Project Title The Risks of Autotomy to Future Survival in Pachygrapsus cressipes	
Abstract Objectives/Goals A series of experiments were conducted on the intertidal crab <i>Pachygrapsus cressipes</i> . When these animals are subjected to mechanical stimulus, such as a predator attempting to remove them from rocks, they respond by either fleeing, or fighting. When choosing to fight, crabs will pinch the predator with powerful claws hoping that the action will make the predator loose its grip. When choosing to flee, crabs will autotomize (self-amputate) the limb(s) being held onto in order to escape. Each time the crab is harassed, it must decide which behavior is most beneficial to its survival. Experiments were conducted in order to test the hypothesis that the decision to autotomize reflects the crab's ability to weigh the risks of future disadvantage to foraging, and more importantly, its ability to adjust its assessment of risk versus benefit as conditions change. Methods/Materials Experiments were conducted by placing the crabs in tanks, allowing them to feed for 7 days, then removing the remainder of uneaten food. The presence of autotomy was then recorded as the choice of <i>Pachygrapsus cressipes</i> to amputate a limb in response to the mechanical stimulus of a narrow forceps. Results In round I, the incidence of autotomy dramatically decreased within only 3 days of starvation and decreased further after the third day. In round II, the incidence of autotomy decreased after only one day of starvation. The number of autotomized individuals was then compared to a control group of fully fed crabs using a c2 test in both round I and round II. Conclusions/Discussion The results indicated that the crabs autotomize less and less with greater starvation time.	
Summary Statement My project attempts to ascertain whether or not starvation is a factor in the innate decision of <i>Pachygrapsus cressipes</i> to autotomize.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Alexandra L.E. Garcia	Project Number S1907
Project Title How Does Temperature Affect the Heart Rate of Crickets?	
Abstract Objectives/Goals To establish the relationship between temperature and the heart rate of crickets. Methods/Materials By gluing a rare-earth magnet to a cricket's abdomen and using a Hal Effect Transducer (HET) capable of reading movement in the .5 micron range. The movement of the insect's heartbeat was measured by observing voltage variations dependant on the distance between the magnet and the HET. The heartbeats were recorded by feeding the HET output voltage to the audio line-in input of a PC. To raise the temperature a heat lamp was used, and a thermometer recorded the change. Results For an increase of 4.4 C, the cricket's heartbeats increased by 44%. Conclusions/Discussion The cricket's heart rate went up with the environmental temperature. Perhaps the cricket's circulatory system is also a cooling system in which blood must go through a heat-radiating element (possibly its wings).	
Summary Statement The effect temperature has on the heart rate of a cricket.	
Help Received My father helped me build the amplifier.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jackie Gibson; Alice McGowan	Project Number S1908
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Project Title
Incubation of Eggs: Homemade vs. Commercial

Abstract

Objectives/Goals
 This experiment is a long term project with several objectives/goals. The first objective was to determine if a homemade incubating device could be as effective for incubating and hatching eggs as that of a more expensive commercial incubator. Our second objective was to use a nutritional yeast supplement to determine if a healthier, better laying chicken could be grown.

Methods/Materials
 Commercial incubator: -egg cartons to hold the eggs in an upright position; -3" by 5" sponge was placed in the bottom of the incubator to ensure a humidity level of 65%; -heating coil to establish and maintain a constant temperature of 99 degrees Farenheit; -23 fertile eggs; -metal wiring along the bottom of the incubator to ensure stability; -thermometer and barometer

Homemade incubator: -Stryfoam Ice Chest used to maintain heat; -cooking rack to support fertile eggs; -egg cartons to hold eggs in an upright position; -heating pad to ensure and maintain temperature of 99 degrees Farenheit; -thermometer and barometer; -3" by 5" sponge for humidity; -30 fertilized eggs; fertile eggs; - donation of 6 dozen eggs from Hy-line Farms.

Results
 incubator type infertile eggs aborted eggs hatchable eggs re-incubated embryos late blooming eggs
 homemade (30 eggs) 37% 10% 23% 20% 30%
 commercial (23 eggs) 35% 4% 25% 92% 8%
 new egg(2 dozen) 0% 8% 100% 92% 0%

These percent values were based on candle-lighting the eggs on day thirteen. On day fifteen, eggs were accidentally unplugged for twenty-four hours. Using our already established set-up, 92% of the chick embryos hatched, while none of the eggs that were unplugged managed to survive.

Conclusions/Discussion
 From this expermint we have concluded taht based on the candle-light method, commercial incubators have a higher hatching rate than homemade incubators. The reason for this is that it is very difficult to maintain a set tempeature when using a heating pad, while commercial incubators are designed to maintain a set tmeperature. In addition to this, we have also noticed that chicks eating the supplemental feed tend to grow and feather at a faster rate. The reason being, the yeast supplement seems to be easier to digest than tradional chicken starter mesh.

Summary Statement
 To determine whether homemade incubators are as effective as commercial incubators.

Help Received
 Hyline Farms for the donation of 6 dozen chicken eggs



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Arun Gupta	Project Number S1909
Project Title What Is the Effect of Changes in Illumination on the Metabolic Rate of Red Worms?	
Abstract Objectives/Goals References on red worms# natural habitat gave descriptions on dampness, temperature range, no direct sunlight, etc., but I didn#t find any mention on their preferred illumination. On cloudy days or early morning hours, I had observed worms in parks and damp lawns. This was contrary to my understanding that red worms like total darkness. Therefore, the objective of this experiment was to find the optimum light intensity preferred by the red worms. This was done by testing the effect of illumination on their metabolic rate. My hypothesis is that their best observed metabolic rate would be around the light intensity of 28 lux. Methods/Materials For experimentation I collected two sample groups of red worms. Group 1 had five 1-inch red worms, and Group 2 had five 2-inch red worms. A homemade spirometer was used to measure each group#s rate of oxygen consumption. The assumption is that the oxygen consumed by the red worms is proportional to their metabolic rate. Three tests of three-minute interval each were done for each of the following light illuminations: 0 lux, 6 lux, 28 lux, 51 lux, and 73 lux. The larger the indicator movement in the spirometer, the higher the metabolic rate of the worms. Results For Group1, the indicator movement is lowest at 0 lux, highest in the range of 6 through 28 lux, and then gradually becomes lower. For Group 2, the indicator movement is also lowest at 0 lux, highest in the range of 6 through 28 lux, and steeply falls after that. These results reveal the illumination range at which the red worms# metabolic rate is the best. Conclusions/Discussion The results support my hypothesis in that the optimum illumination range for worms is from 6 to 28 lux for their best metabolic rate. This Information would be helpful for understanding a better habitat for farming healthier red worms (worms are farmed on a large scale for commercial sale).	
Summary Statement My project is about finding under what light intensity do worms have their highest metabolic rate.	
Help Received Teacher helped with Potassium Hydroxide solution. My father helped me in purchasing materials and in wiring the dimmer with the light bulb	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Mark A. Herron	Project Number S1910
Project Title Isolation and Sequencing of Mitochondrial DNA	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective in this project is to determine whether the amount of variation present within a population is sufficient to warrant a separation of the group into various species.</p> <p>Methods/Materials DNA was isolated, purified, quantified, and visualized. Once the DNA purity was varified, isolates were exposed to PCR condntions and specified primers were used to obtain an 1100bp sequence of the mitochondrial gerone. The sequences were then run throguh an ABI flourescent sequence. Lastly, the sequences were compared using various computer programs to analyze and determine the degree of variation.</p> <p>Results Ample variation was found to support the separation of the species into two distinct groups.</p> <p>Conclusions/Discussion Additional research must be done in order to support the findings from this preliminary project.</p>	
Summary Statement My project was about finding the genetic variation within a large group of iguanas	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Joshua A. Kroll	Project Number S1911
Project Title Optimizing Growth in Captive Aurelia aurita Juveniles	
Abstract Objectives/Goals At the Monterey Bay Aquarium, moon jellies, <i>Aurelia aurita</i> , are cultured for exhibits and as food for a diverse group of animals. It has therefore become important for staff scientists to be able to grow the jellies to maturity as quickly as possible. Among the variables which affect the growth rate are stocking density, size of the daily ration, and distribution of the ration throughout the course of the day. This project aims to test the last variable and determine whether <i>A. aurita</i> grow faster when fed only once every day or when fed their ration in two parts spaced over several hours. Unpublished observation suggests that it takes approximately eight to ten hours for each ephyra to clear its gut. Animals fed twice per day should thus grow faster as they will be able to eat again after clearing their guts and less will leave the system as waste. Methods/Materials The jellies were measured over a two week period. The total daily ration for both groups was 1400 ml. of brine shrimp nauplii. One group was fed the entire allotment in the morning. The other group was fed their portion in two parts spaced eight hours apart. The average sizes of the animals at the outset and at the end were compared. Results Initial data suggest that the tanks were originally the same. After two weeks under the varying conditions, the animals fed twice every day were significantly larger. Conclusions/Discussion The results suggest that the moon jelly <i>Aurelia aurita</i> grows faster when fed twice daily, as compared with once daily. As this may only be true up to a point, it will be necessary to test other divisions that could be made to the ration, such as three times daily or a trickle feed giving 1400ml per day.	
Summary Statement This experiment is designed to test the effects of varying the feeding regime of captive <i>Aurelia aurita</i> on the growth rate during the transitional phase between the juvenile (ephyra) stage and adulthood.	
Help Received Used lab equipment at Monterey Bay Aquarium; used Monterey Bay Aquarium's animals; aquarist Chad Widmer consulted on moon jelly life cycle/project idea/methods; Dr. Rose Ray, of the Exponent corporation, aunt, explained the ANOVA analysis which was used.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Riza A. Laraya	Project Number S1912
Project Title The Role of Odors in the Shell Selection of Pagurus samuelis	
Abstract Objectives/Goals Experiments were conducted to test the role of odor in the shell selection of Pagurus samuelis by using dead gastropods and dead conspecifics. Attraction to the chemical odor was examined in multiple trials using different hermit crabs. Two types of trials were done; one using empty gastropod shells and the second is using caps as artificial shells. Methods/Materials Hermit crabs were collected from Sunset Cliffs in Ocean Beach, San Diego along with salt water and spare shells. They were then put in an aquarium with a rocky dry area and a side with 1.5cm of water. A soldering iron was used to heat the shell of the hermit crab and coax it to come out. The naked crab was then put into a rectangular container, in 2.5cm of salt water along with the options of shells or caps and the odors. Results The data supports the hypothesis that the odor of the dead conspecific or snail plays a role in the selection of shells by Pagurus samuelis. The hermit crabs choose the dead conspecific scent more often than the snail scent and unscented option. Chi-square tests were conducted to determine the significance of any difference. Based on that test, I rejected the null hypothesis based at a significance level of 0.05 for the shells and 0.001 for the caps (artificial shells). Conclusions/Discussion The data supports the concept that the odor of dead conspecifics plays a significant role in the selection of shells or caps for Pagurus samuelis.	
Summary Statement Experiments were conducted to test the role of odor of dead gastropods and dead conspecifics in the shell selection of hermit crabs. In trials where crabs had the option of choosing an odorless scented shell, dead conspecific scented shell	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Clara L. Laursen	Project Number S1913
Project Title What Are the Effects of a Stressed Host Plant on Aphids?	
Abstract Objectives/Goals The objective of my project was to determine how various aspects of aphids , such as weight and adaptive behavior(reproduction or translocation), would be affected by living on a stressed host plant. Methods/Materials 18 identical sugarbeet sproutlings in identical pots of soil were obtained. Half of them were randomly chosen to be stressed. They were stressed by being transplanted into dry soil identical to that which both had before. Using 1 fine camelhair paintbrush, 72 green peach aphids of the same age were placed 4 to each plant. Everyday for the next approximately week (depending on the age of the aphids and how long it takes them to reproduce) use an opti-visor every day to count the aphids. When all of the aphids were adults, I used a Denver Industrial Company TR-64 top loading balance to weigh each aphid and compare the stressed versus the non-stressed aphids. Results There was a consistently larger number of aphids on the healthy plants. However, there was no significant difference in the weight of the aphids. Conclusions/Discussion My project suggested that aphid's weight and size are not affected by living on a stressed host plant, and that aphids will deal with the problem of a stressed host plant by simply moving.	
Summary Statement My project is about the effects of a stressed host plant on aphids.	
Help Received Entomologist Greg Walker, from UCR, helped me in several ways. He provided me with aphids, plants, space in a greenhouse, and information on how to care for them.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jennifer M. Maulding	Project Number S1914
Project Title Does Size Matter? Bird's Beak Size to Seed Size	
Abstract Objectives/Goals The basic idea of my project was to determine whether or not the size and shape of a bird's beak is proportional to the seed size and shape that it would choose to eat. I did this with Charles Darwin's theory of natural selection in mind. Methods/Materials To complete this project I chose millet, buckwheat, safflower and sunflower seeds to test with. The birds I chose had a wide variety of beak sizes, but the beak shapes were controlled. These birds consisted of parakeets, lovebirds, cockatiels, and parrots. The first thing I did was separated the seeds, and then put them into petri dishes in certain amounts (millet- 44.46 grams, buckwheat-29.63 grams, safflower- 34.03 grams, sunflower-22.51 grams). By placing these seeds into the cage of each bird, one bird to one cage, at the same time, I allowed the bird's to have a choice at what seed they wanted to eat. I was not forcing them to eat anything. I left the seeds in for twenty-four hours, then upon my return I collected both the seeds and the leftover shells. I weighed this and recorded each weight. I repeated this for a total of thirty trials. Results My results came out showing that my hypothesis was correct in thinking that the size and shape of a bird's beak is proportional to the size and shape of seed it will eat. The smaller beaked birds, the cockatiels and parakeets, chose the smallest seed, millet. The middle sized beaks of the lovebirds chose the middle sized seed, safflower. Then finally, the largest beaked birds, the parrots, chose the largest seed of them all, the sunflower seed. Conclusions/Discussion My conclusion is that the experiment was a success. I was able to determine what seed they preferred, and by doing so concluded that the theory of natural selection goes hand in hand with my project. It just takes common sense to see that a large seed is not going to fit into the small beak of a small bird. Seed size is proportional to beak size, and evolution has played its part, and made the birds beaks the way they are today.	
Summary Statement To see if the size and shape of a bird's beak determines what size and shape seed it will eat.	
Help Received Mother helped with display boards "look", Father constructed board, Grandmother let me use her birds.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Courtney A.R. Morris	Project Number S1915
Project Title Artificial Incubation vs. Natural Brooding	
Abstract Objectives/Goals The objective is to determine whether Natural Brooding of Artificial incubation produces healthier chicks. Methods/Materials A square wooden laying box built to these specifications: of 2.5ft by 2.5ft with a height of 2.5ft, large bag of cedar chips or sawdust, One mature female chicken at laying age, 1 mature fertile rooster, 12 freshly laid eggs, 6 egg incubator, thermometer, and scale. Six eggs were incubated and 6 eggs were brooded by the Hen who laid them. When the eggs hatched three chicks of each set of 6 eggs were weighed and their height measured. The chicks# weights and heights were of the 3 chicks of the incubated and brooded chicks were averaged and compared. Results The height average of the chicks naturally brooded was an insignificant amount of .5 inches higher than the height of the artificial incubated chicks. The weight of brooded chicks and incubated chicks on an average equal. Conclusions/Discussion In conclusion, brooding doesn#t produce less healthy chicks than incubation and Incubation doesn#t produce healthier chicks than brooding.	
Summary Statement My project was intended to find out whether Natural Brooding of chicks or artificial incubation produces chicks healthier [heaviest and tallest] than brooding.	
Help Received My Mother checked the temperature and turned the eggs during the day while I was at school.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Leilani N. Pemberton	Project Number S1916
Project Title The Effect of Air Temperature on the Stridulation Rate of Acheta domesitcus	
Abstract Objectives/Goals The objective is to determine if air temperature affects the stridulation rate of Acheta domesticus. Methods/Materials 6 terrariums were set-up with one male and one female cricket in each terrarium. Using a stopwatch and thermometer, the stridulation rate (# of chirps per 15 seconds) was determined for all 6 crickets at 5 different temperatures. There were 3 trials for each cricket. First the average stridulation rate was calculated for each cricket at 5 different temperatures. Then the total average stridulation rate was calculated (total avg. stridulation rate = the avg. stridulation rate for all 6 crickets divided by 6). Results The total average stridulation rate at 27 degrees Celsius was 29.22 chirps. The total average stridulation rate at 13 degrees Celsius was 2.33 chirps. Cricket #1 had the highest average stridulation rate at all temperatures. The stridulation rate increased as the air temperature increased. The data showed that a one-degree difference in temperature impacted the stridulation rate. Conclusions/Discussion The air temperature does affect the stridulation rate of Acheta domesticus. Thus, my hypothesis that air temperature would affect the stridulation rate of Acheta domesticus was supported by the results.	
Summary Statement My project is about the effect of air temperature on the stridulation rate of Acheta domesticus.	
Help Received Mother checked out reference books and helped clean terrariums.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ann M. Porter	Project Number S1917
Project Title Comparing Fruit Preferences in Labstock and Wild Drosophila melanogaster	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Labstock and Wild Drosophila melanogaster, fruit flies, were collected and observed over a number of days in intervals of about an hour.</p> <p>Methods/Materials During each observation period data were collected at the end of 5-minute increments of time to determine fruit preference in the two different types of D. melanogaster. Equal amounts of each fruit (by weight) were added to a non-nutrient agar media that was poured into agar plates. 4.5 cm diameter discs were cut from the agar plates and evenly distributed in 4-liter plastic containers. Fly preferences were observed in regular light and dim red light.</p> <p>Results Results showed that under dim red light flies would only crawl and were not very active. The data tables show that the Labstock flies spent a significant amount of time on the control, which has no nutrients, possibly indicating that the Labstock flies, grown in a controlled atmosphere for many generations, had lower survival skills than the wild flies.</p> <p>Conclusions/Discussion Overall the Labstock Drosophila melanogaster slightly preferred the apple medium out of orange, pear, banana, and control. The Wild Drosophila melanogaster preferred orange, but not by a significant amount.</p>	
Summary Statement Over time Labstock and Wild Drosophila melanogaster (fruit flies) were observed in containers in order to compare fruit-type preferences.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ardee Rivera	Project Number S1918
Project Title Effects of Auditory Familiarity in Mate Selection for Acheta domesticus	
Abstract Objectives/Goals The objective of my project is to determine if the familiarity of a male house cricket's chirps will have an effect on the length of each male's courtship call and female mate selection. Methods/Materials Cricket nymphs were sexed and separated into one group of females and two groups of males. Once mature, one male group was placed in a box next to an aquarium with a group of females and were allowed one week to hear each other's chirps. Female crickets were placed individually in observation chambers with males whose chirps they have heard, other females with males whose chirps they have not heard, and some females with both. The mate selection, mating call lengths and other key points in the mating process were timed and recorded. Results Females preferred familiar males over unfamiliar males. Unfamiliar males also had to produce a longer mating call than the familiar males before the female would mount the male. Conclusions/Discussion I concluded that auditory familiarity does have an effect on mate selection and mating call length.	
Summary Statement I tested to see if the familiarity of a male cricket's chirps had an effect on female mate selection and male mating call length by placing females in observation chambers with familiar or unfamiliar males, and some with both.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Katrina Maria C. Steinhauer	Project Number S1919
Project Title Habitation in Mosquito Larvae Response to Water Disturbance: A Two Year Study	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my study is to investigate the response of mosquito larvae to the same disturbance, motion, in different kinds of water and in different water temperatures, and determine if a pattern of habituation, decreasing response, results. In the first year, my hypothesis was that the larvae would adjust to the pond water sooner than in other waters tested, and resurface faster after the disturbance. In the second year of study, I tested my hypothesis that that the larvae would show habituation in both 25°C water and 30°C water, but take longer to resurface in the 30°C water than in the 25°C water.</p> <p>Methods/Materials I tested <i>Culex quinquefasciatus</i> #2 mosquito larvae stage because I know that larvae naturally surface to breathe and they will swim downward if they are disturbed. The first year, I put ten larvae in different sources of water, and after letting them get used to the water for a set time, I stirred each water surface equally. I timed the seconds for the first larva to resurface. I repeated the test ten times for each water sample, comparing response time for each batch of larvae. The second year, I compared response times for larvae in water temperatures, 25°C and 30 °C. For each run, I put ten larvae in a container of tap water floating in a water bath, checked temperature and pH. I timed the time for the first larva to resurface five times for each of five runs, for a total of twenty-five runs at each temperature.</p> <p>Results First year: Percolation pond (chlorinated) tests 1-5 averages resulted in lowest total average of all water samples tested (13.36 seconds); Final Effluent (un-chlorinated) tests resulted in highest average time (15.97 seconds). Second year: The 25 °C water had 163.11 T-test average; The 30°C water had a 15.84 T- test average, showing tremendous difference between the two temperature averages.</p> <p>Conclusions/Discussion First Year: My hypothesis was correct in that pond water showed a decreased response time, but, there was more of a decrease in other waters tested. Second Year: My hypothesis was incorrect; tests did not show a decreased resurfacing time and no obvious pattern of habituation in either temperature, but, after applying T-test to results, the difference between the two temperatures is over 100%. I believe that the temperatures, even though only five degrees apart, affect larvae habituation differently.</p>	
Summary Statement The purpose of my project is to investigate mosquito larvae response to the same disturbance, motion, in different kinds and temperatures of water, and determine if a pattern of habituation, results.	
Help Received I used the water bath at Sanger High with help from Mr. Whittington; Mom helped with board; Kearny Mosquito Lab gave me larvae.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jason E. Suvanto	Project Number S1920
Project Title Utilization of Microlife in an Artificial Environment	
Objectives/Goals My hypothesis was to determine if common pond microorganisms would be a beneficial factor in an artificial environment such as an aquarium.	
Abstract Methods/Materials Item/number needed/additional information. 1.Glass/plastic fish tanks (2) Any size; 2.Water pumps (3) Find one that is made for the tank you have; 3.Under gravel filters (2) Both must be made for the tank you have; 4.Gravel (about 4 lbs) any color; 5.Plastic plants (4) two per each tank; 6.Distilled water (about 4 gal); 7.Microorganism identification book (1) to identify certain species; 8.Glass jars (2) any size; 9.Fish (4) two per tank *Note- fish in this experiment are called Zebra Danios; 10.Funnels (1) shaped to be fit inside jar; 11.Microscope (1) to view and observe certain species; 12.Eye droppers (10) Used to separate the wanted species from the unwanted; 13.Notebook (1) to record findings; 14.Pond Microorganisms (depends) Make sure you get the species mentioned in my experiment for best results; 15.Tape, string (one roll) For the construction of the light trap; 16.Glow sticks (depends) Number depends on number of trials; 17.Tropical fish flakes (depends) Food for your fish in the control aquarium. Basic Experimental Method: Set up your aquariums by following the instructions that it comes with. Fill both aquariums with distilled water and place two fish per aquarium. Feed fish once a day and feed one aquarium with microorganisms and the other with flake food. Observe everything that happens in a notebook. Follow this procedure until the trial is over. Clean out everything and replace with new fish. Set up the aquariums again and follow the same directions.	
Results I discovered that the common pond organisms played a major role in the artificial environment. Not only did they give the fish something nutritional to eat, they microfiltered out the water and kept the tank surprisingly clean. This just shows how much of a benefit these little creatures can have on a totally freshwater environment.	
Conclusions/Discussion My results, in fact, did support my hypothesis, meaning that the organisms were a beneficial factor to the artificial environment. This project shows the importance of using common pond organisms in freshwater fish aquariums. Without these little crustaceans the aquarium would be polluted with algae, waste, and debris just like in their natural environment.	
Summary Statement Finding a use out of common pond crustaceans.	
Help Received Parents were my financial support	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Mary Tran; My Tran	Project Number S1921
Project Title The Effects of Varying Sea Water Ion Concentrations on Sea Urchin Fertilization	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our objective is to determine the effects of varying ion concentrations in modified sea water on sea urchin fertilization.</p> <p>Methods/Materials Female sea urchins were induced to spawn; male sea urchins were induced to spawn. Eggs and sperm were introduced to each other in the varying sea water concentrations.</p> <p>Results We found that the absence of sodium in the modified sea water solutions (with all other naturally-occurring components present) had the most negative impact on sea urchin fertilization; In conditions where sea urchin eggs and sperm were placed in sea water solutions with the absence of sodium, no eggs were able to fertilize.</p> <p>Conclusions/Discussion Upon completion of our experiment, we found that the absence of ions occurring in the highest percentage in natural sea water has the most impact on the inability of the sea urchin eggs to fertilize.</p>	
Summary Statement The purpose of our experiment is to determine the effect of varying sea water ion concentrations on sea urchin fertilization	
Help Received We owe sincere thanks to Mrs. Pam Miller and Mr. Chris Patton	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Christina C. Van	Project Number S1922
Project Title Certain Colors = More Dust Mites?	
Abstract Objectives/Goals To see if certain colors attract more dust mites more than others. I know that dust mites usually attract to areas where there is dust, bacteria, mould, or other materials that they feed on, but do they prefer certain colored areas to another? Before beginning my experimentation, I hypothesized that they would attract to black more than any other color because black absorbs more solar energy more than any other color, and dust mites tend to thrive in warm places. Methods/Materials To test my problem, I placed a set of six different colored felts (black, white, red, pink, orange, yellow, and white) in six different locations where dust mites are ideally found (pillowcase, carpet, couch, rugs). Since I was testing if certain colors attract dust mites more than others, the pillowcase, carpet, rugs, and etc. had to be of a solid color so that I could have a controlled experiment. I would let the pieces of felt sit on the areas, and I would observe each sheet under a light microscope (100, 400X) for 4 minutes each. In each location, I would rank the different colored sheets according to the number of dust mites I saw on them. Every other day, I would repeat this procedure. Results After I did 60 tests, I graphed and tallied all of my data and saw that yellow attracted more dust mites than the other five colors. Orange came in second with pink behind it. White came in after pink, then the darker colors red and black. The differences between the attraction of dust mites to these different colors were noticeable, but not drastic. Conclusions/Discussion As one could see, my hypothesis is actually the opposite of the results, for black came in last. I expected dust mites to thrive in darker regions of the color spectrum because darker colors absorb more solar energy. White's results were scattered throughout the experiment, and it was not the color that attracted dust mites consistently because it reflects off too much light. Therefore, the mid-ranged colors of the color spectrum (yellow, orange, and pink) attracted the most dust mites because they absorb the adequate amount of solar light for dust mites to thrive on. In conclusion, dust mites attract to the middle-ranged colors of the color spectrum more than darker and lighter regions.	
Summary Statement To see if certain colors attract dust mites more than others.	
Help Received Borrowed microscope from school	