



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Julie Baker; Karen Nichols	Project Number S2001
Project Title Something Smells Fishy! The Study of Molly Fish, in Relation to the Chemical Migratory Phenomenon of Alaskan Salmon	
Objectives/Goals If Molly Fish are raised in a controlled saline environment, then they will ultimately recognize their "home saline concentration" and swim back up stream, similarly to King salmon.	
Abstract Methods/Materials Once maze has been built and fish have been raised for 3 weeks in 3 separate tanks that hold 3 different saline concentrations, begin testing. Fill the maze with 10 Gallons of de-chlorinated water. Then, mix saline concentration in a separate of the fish's environment/ home tank#. Once all of the temperatures match and the water has been de-chlorinated take the group of fish being tested and place in the ocean# part of the maze. Wait two minutes for the fish to get acclimated to the water and at two minutes distribute two mL of home# saline concentration, into whichever stream being used. (At this point of the experiment only one stream# has the fish's home# concentration which is less than 1.012) After putting in the first application of saline concentration lift up the net and allow fish to swim around. Once the stopwatch reaches 3 minutes, every 30 seconds following until 5 minutes add an additional two mL of home# saline concentration (a total of 14 mL of saline concentration). At 7 minutes tack down the net and record the final destinations of each of the fish. The experiment should be conducted 3 times per group, changing the stream that holds their home# saline concentration.	
Results The majority of all 3 fish groups chose the correct home concentration# over the concentrations the fish had not been raised in. Group #1, raised in the highest salt concentration averaged 72% accuracy. Group #2 overall did the best job of recognizing the correct stream. The average identification of the correct stream for Group #2 was 83%. The final group, Group #3 identified the correct stream 77% of the time. All the Mollie's, no matter which saline concentration each were raised in, recognized the correct stream 77% of the time.	
Conclusions/Discussion Overall 77% of the Mollies tested were able to recognize the correct stream. The data supports the hypothesis that, like King Salmon, Molly fish were able to identify the saline concentration that each was raised in, a majority of the time. Migratory patterns of Molly fish were similar to King Salmon and a more extensive experimental design could allow the industry of fish farming to become more natural.	
Summary Statement If Molly Fish are raised in a controlled saline environment, then they will ultimately recognize their home saline concentration#, and swim back up stream, similarly to King salmon.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Audrianna Bonilla; Rebekah Doyle	Project Number S2002
Project Title U.V. on A.E.	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals We would like to discover why our local sea anemones have small rocks, shells, and sand on their stalks. We believe that it could be for either for protection from u.v. ray protection, or camouflage from predators.</p> <p>Methods/Materials We are going to use 36 perfectly healthy sea anemones, and place them into a controlled salt water tank. The tank is divided down to the middle to seperate our two groups of sea anemones. One group will have their rocks, sand, and shells removed from their shafts. We will feed them the same amount of food. and give them exactly 12 hours of uv light a day. The uv light will be provided by a u.v. black light.</p> <p>Results All 18 of the uncovered sea anemones died over a course of 11 days. However only one covered sea anemone died, believed to be due to natural causes. We believe it was due to natural causes because its appearance was different, from the ones who had died due to u.v. rays.</p> <p>Conclusions/Discussion We believe with out a doubt, that the shells, rocks, and sand on the shafts of the sea anemones, is most certainly for u.v. protection. Keepings in mind that our u.v. ray light was significantly less powerful then the actual sun.</p>	
Summary Statement The project was about discovering what purpose the small shells, rocks, and sand on the stalks of the sea anemones is.	
Help Received If we had any questions regaurding our project, we asked the marine biology teacher at our school, Dave Wilson, everything was done by us.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Laura J. Botzong	Project Number S2003
Project Title The Effects of Environmental Nitrite Levels on the Reproductive Success of Purple Sea Urchins	
Abstract Objectives/Goals The purpose of this experiment was to determine how environmental nitrite levels impact the reproductive success of purple sea urchins. The hypothesis of this experiment was that higher environmental nitrite levels have a negative affect on reproductive success. As part of a three-year study, the hypothesis this year was based on previous results which showed that higher levels of nutrient pollution do not encourage larval growth. In addition, high nitrogen levels are toxic to a variety of marine life. Methods/Materials To test if high nitrogen levels are toxic to purple sea urchins, mature purple sea urchins were collected from two test sites, which differ in their pollutant levels (as rated by Heal the Bay Beach Report Card): Inner Cabrillo Beach and Portuguese Bend Cove. The sea urchins were spawned, their eggs fertilized and fixed with formalin, and the number of eggs counted. A water sample from each site was tested concurrently for nitrite levels. Results The data supported the hypothesis; Inner Cabrillo Beach had lower water nitrite levels than Portuguese Bend Cove, and there were more eggs counted in the Cabrillo samples. Conclusions/Discussion These results call for deeper, more comprehensive research with revised protocols on this subject.	
Summary Statement This project investigates a possible correlation between high environmental nitrite levels and compromised reproductive success in purple sea urchins.	
Help Received Cabrillo Marine Aquarium#s Aquatic Nursery for providing a laboratory in which I performed my experiments; Dr. Kiersten Darrow & Dr. Juli Kalman for advising me on my project; the Aquarist team for harvesting half of the urchins used; all the Lab Assistants for supervising my procedures	



CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

Name(s) Keheira L. Burnett	Project Number S2004
Project Title Cages or Tanks?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The study seeks to answer the question if aside from the lab mouse, can a zebrafish be used as a model to assess drug toxicity and efficacy. A parallelism of both animals will be made to test the hypothesis. The main purpose is to inform the general public especially the students of how drugs are discovered and/or made and what initial steps are taken to test its effectiveness.</p> <p>Methods/Materials A thorough research about the mice and the zebrafish was made-their taxonomy, distribution, description, varieties, care. A general observation of both live organisms were conducted - their behavior when fed; when habitat is disturbed by a light tap or knock; and behavior when light coming from a flashlight is shone on them. The body temperatures of both were taken using a temperature probe connected to a CBL and attached to a graphing calculator for 60 seconds. A cotton bud was used to get saliva samples of each specimen; the corresponding pH was measured using a pH paper. A dissected specimen of each available in a college lab was also examined. The internal organs were inspected. Using a microscope, samples of sensory hair cells, brain and muscle tissues were checked.</p> <p>Results Zebrafishes are an economical, efficient complement to the lab mice for drug discovery research. There is no significant difference observed on their behavior to other animals when subjected to certain conditions especially when given food. As a vertebrate, the zebrafish body plan shares many similarities with mammals, e.g. the cardiovascular system consists of a two-chambered heart and a vascular system containing arteries and veins; sensory hair cells and brain cells were also similar. Although, it only takes two electrodes to get an electrocardiogram (ECG) of the zebrafish which is handy for gauging a drugs cardiovascular effects rapidly and precisely, it is proven that zebrafish ECG pattern is very similar to human beings.</p> <p>Conclusions/Discussion Based on the research conducted, it was shown that a zebrafish could be used as an alternative to the lab mouse for drug discovery research proving my hypothesis valid.</p>	
Summary Statement This research seeks to investigate the parallelism of the zebrafish (Danio rerio) to the mouse as a good model used to assess drug toxicity and efficacy.	
Help Received Inspected dissected specimens of a mouse and a zebrafish at El Camino Compton Educational Center under the supervision of Dr. Aasi; was able to observe each live organism in a pet store by approval of the owner, Mr. Kim.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Emerson Driver; Anthony Tran	Project Number S2005
Project Title Effect of Waves on the Hiding Behavior of Pagurus samuelis	
Objectives/Goals Submitted by Partner	Abstract
Summary Statement The effect of waves on the hiding behavior of blue-band hermit crabs.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) James T. Hughes	Project Number S2006
Project Title Corallimorpharia: A Project in Reproduction	
Abstract Objectives/Goals While doing this experiment, I hoped to learn about the different reproductive methods of the Mushroom Coral, and induce them using a razor blade. I also hoped to prove or disprove the myth that putting a sample of these Mushroom Corals in a blender would be another successful means of induced reproduction. Results I proved that inducing the reproduction of corallimorpharia mushroom corals was possible. My experiment showed that it was possible for cut specimens so survive, though only if they retained a potrtion of their "mouth piece." Conclusions/Discussion I was correct in that the induction of asexual reproduction in Corallimorpharia Mushroom Corals could be possible, and successful. However, the test of the blender proved otherwise. As the blender chopped the specimens too fine, no mouth pieces survived, which in turn meant no surviving specimens. I believe the experiment involving the blender would be successful if i had larger specimens and less chopping time in the blender.	
Summary Statement This experiment focused on inducing the asexual reproduction of Corallimorpharia Mushroom Corals through the use of a razor blade and blender.	
Help Received Guardians helped set up and maintain the salt water tank.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) John Michael L. Jones	Project Number S2007
Project Title The Mantid Project, Year 7: Male Pheromone Production in Iris oratoria	
Abstract Objectives/Goals The objective was to use a y-maze to provide evidence that male Iris oratoria produce pheromones to signal their presence to female Iris oratoria. If all factors that could influence the movement of a female Iris oratoria are neutralized except the presence of male pheromones, then female movement towards the male indicates that male Iris oratoria produce pheromones, to signal presence. Methods/Materials A Y-maze configuration allows the subject to choose between two directions and was used to test male Iris oratoria for pheromone production. An air pump was used to move the air from the source area to the vicinity of the test subject. The test subject is placed on the X and a male is placed on the right side, in a container allowing airflow. The left side was the blank. The females movement was observed. Three different assays were performed. The first was as described above (scent only trials). The second was performed similar to the scent only but a female enclosed in a jar was placed next to the male as a visual aid (scent with model). The third assay was a visual only trial, where the male was placed in front of the view block inside a sealable jar. Results Females moved in different directions. The direction the females went was a direct result of many confounding variables. Blocking was utilized to divide the females according to age, oöthecae production, physical stability, and possible personality. Quadrant scores were assigned to areas in the Y-maze in order to allow statistical evaluation of female movement. Wild caught females consistently moved towards the male. Young adults most frequently avoided the male. Some females appeared to change their minds, stopping and redirecting, either toward or away from the male. Conclusions/Discussion During the Y-Maze trials, all factors but the variable were neutralized, however mixed reactions, rather than just movement towards the male, provide evidence for the production of male pheromones. During the trials, movement related actions of the females signaled either interest or disinterest in the male, the females knew the male was near. The induction of a pheromone enclosed female (the model) next to the male caused a decrease in the mean quadrant score, meaning a greater interest in the male. The most obvious deduction from this was that males produce more pheromones with a visual of a female.	
Summary Statement This series of behavioral assays whose purpose is to investigate possible male pheromones in Iris oratoria.	
Help Received Grandmother helped with board construction; Mother helped with editing.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Daniel Keeley; Kathryn Keeley	Project Number S2008
Project Title Factors Affecting Competition for Food in a Woodland Bird Community	
Abstract Objectives/Goals This year's project is a continuation of our project from last year (Feeding Preferences of Woodland Birds), in which we discovered that seed-eating bird species differ in their preferences for the location of where they feed and the type of seeds they prefer. There is much written in ecology that suggests these differences are due to behavior that reduces competition. This year our project investigates whether or not competition might be reduced by feeding at different times of the day and by different levels of aggression. Methods/Materials We used a homemade bird feeder for our three experiments. Prior to all experiments we kept seeds in the dishes to attract birds to our area. In addition, to analyze our data better we used statistics (Student's T-test and Linear Regression Analysis) with a program called "Systat 11". Results Our main focus was on the time of day that birds prefer to feed. Our hypothesis was that birds will feed at different times of day to avoid competition. After three months of testing we found that our hypothesis was supported. Some species preferred early morning, others mid-day and others late afternoon. In our second experiment we hypothesized that aggressive acts would vary between species and with the time of day and amount of food available. Neither time of day or amount of food affected aggression but species differed a lot in their tendency for aggression. Also, birds at the feeder (we called residents) were much more likely to be aggressive than birds invading (birds coming to the feeder while the residents were present), and residents were much more successful at driving the other bird off than were invaders. Conclusions/Discussion In conclusion, we believe that birds in this seed-eating community compete for food by feeding at different times of the day and by differences in their aggression towards one another.	
Summary Statement Our project investigates whether or not competition for food might be reduced by feeding at different times of the day and by different levels of aggression exhibited by birds in a woodland community.	
Help Received Father gave suggestions for the project and proofread papers; Mother helped cut paper & backgrounds	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Sophie H. Klimcak	Project Number S2009
Project Title Electric Fish Language: Communication through Electric Fields	
Abstract Objectives/Goals The Black Ghost Knifefish (BGK) is a nearly blind, weakly electric fish that produces and detects electric fields in order to both locate prey and communicate with mates during courtship rituals and aggressive rival interactions. In this project, I attempted to teach this fish a two word electric field language that would enable me to control the movement of the fish between two regions of an aquarium. Methods/Materials Using a standard conditioning method with food as the positive reinforcer, I trained a test fish to swim through a hole in a dividing wall of an aquarium into a 2nd chamber when I applied a specific type of electric field pulse to the aquarium. To do this I used a computer sound card, pulse generation software, and a pair of submersed electrodes. I trained the same fish to remain in its original chamber when a different type of electric field pulse was applied. A similar control fish was trained to always remain in the original chamber when either type of pulse was applied. Results I had hypothesized that I could successfully communicate with these fish and control their swimming behavior, making the test fish either stay or swim out of the chamber depending upon the type of pulse that I applied. My initial results did not verify this hypothesis. I surmised that this failure was due to a poor training method. I am continuing this experiment at the present time with an alternative training method and will present my latest results at the State Science Fair. Conclusions/Discussion My initial experiments did not support my hypothesis that this fish is capable of recognizing and responding appropriately to the type of electric field pulse that is applied. At the time of abstract submission I do not have adequate data with my alternative approach to reach a definite conclusion on its cognitive ability.	
Summary Statement I tested whether the Black Ghost Knifefish could use its electrolocation sense to distinguish between two different electric field waveforms, a capability that would enable me to communicate with the fish and control its movement.	
Help Received I would like to thank my father for showing me how to measure the fishes electric field. I would also like to thank Robert Farley who told me about the Black Ghost Knifefish several years ago and got me interested in doing experiments with them. Finally, I thank Dr G. Emde and Dr. Brian Rasnow.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Bonnie R. Lei	Project Number S2010
Project Title To Speciate or Not to Speciate? Population Structure of Haminoea vesicula in the Northeast Pacific	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Two separate populations of <i>Haminoea vesicula</i> (Gould, 1855) are assessed based on complete specimens and shells collected primarily in British Columbia, Canada and Southern California, United States with the purpose of determining whether there are significant differences between them to justify a speciation event for this species.</p> <p>Methods/Materials Specimens (personally collected or archived in museums) are compared using morphological and genetic characteristics. Complete specimens are from 4 different locations in the north and 4 in the south with additional dry shell specimens. Approximately 5-10 slugs are collected from each locale. Through the use of SEM micrographs, camera lucida, and digital photography, diagnostically reliable features including the external morphology, shell structure, male copulatory organs, radulae, and gizzard plates are evaluated after specimen dissection. Partial 16S rRNA genes are extracted from internal tissue using Chelex 100, Proteinase K, and/or phenol: chloroform then run in PCR. Successful extractions are sent for sequencing then analyzed using computer program Geneious.</p> <p>Results Consistent differences are found in the external morphology (coloration), radulae (rachidian teeth cusps, lateral teeth serration, outer teeth length), and gizzard plates (denticulation), while the shell structure and male copulatory organs present no variations. The 16S sequences from the three southern California specimens have low variability within the same area; two from the same location collected in different seasons are the same haplotype while the other varies in only one base pair. Thus far, none of the northern specimens have been successfully extracted due to inefficacy of all extraction protocols with long-term preserved specimens.</p> <p>Conclusions/Discussion With the presented data it is clear that the two populations show consistent variation suggesting the possibility of divergence. However, further investigation and corroboration of differences is needed before sufficient evidence is compiled to support the establishment of a new name for the northern population. Obtainment of fresh specimens from the northern population or a more effective extraction protocol for long-term preserved opisthobranchs will provide solid evidence of whether a speciation event occurred.</p>	
Summary Statement Northern (British Columbia, Canada) and southern (Southern California, United States) populations of <i>Haminoea vesicula</i> are compared morphologically and genetically to determine whether or not a speciation event occurred for this species.	
Help Received Used lab equipment at California Polytechnic University, Pomona under the mentorship of Dr. Angel Valdés. Participant in the Southern California Academy of Sciences Research Training Program.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Stephanie Lin	Project Number S2011
Project Title Mechanism by which Methoprene Accelerates Behavioral Development in Honey Bees, <i>Apis mellifera</i>	
Abstract Objectives/Goals In worker honey bees (<i>Apis mellifera</i>), juvenile hormone III (JH) is responsible for regulating the division of labor within a colony. JH titers increase with age, and the rate of this increase paces the transition from a bee's nursing to foraging functions. Methoprene, a JH analog, is used to accelerate this behavioral development and induce precocious foraging. My objective was to determine whether methoprene acts by influencing a bee's endogenous JH secretions or by serving as an agonist in place of JH. Methods/Materials To determine methoprene's mechanism, I studied the JH titers of methoprene-treated bees from the preforaging to early foraging stages. Newly emerged bees were treated with methoprene (experimental group) or acetone (control group) and released back into their colonies. 8 bees from each group were collected every 3-4 days and sampled for their haemolymph. I then ran Radioimmunoassays to measure the JH concentration in their haemolymph and analyzed the results. Behavioral observations were also made to ensure the effectiveness of methoprene in accelerating foraging behavior. Results Two separate trials indicated that as the bees matured, there was no statistically significant difference between the JH titers of methoprene-treated and untreated bees (ANOVA, $P > .3$). Behavioral observations confirmed that methoprene did accelerate the onset of foraging in treated bees (t-test, $P < .0009$). Conclusions/Discussion This experimental data demonstrated that the precocious foraging was not a result of artificially increased JH titers, indicating that methoprene accelerates behavioral development without affecting endogenous JH. This is most consistent with the hypothesis that methoprene acts as an agonist to activate the same metabolic pathways as JH. This pesticide-related apiculture research is especially critical today because of the "Colony Collapse Disorder" phenomenon that is so heavily damaging to the agriculture industry. The information also offers a better overall understanding of the mechanisms of JH in bee development.	
Summary Statement An investigation into how methoprene, a juvenile hormone analog, works to accelerate a worker bee's transition between nursing and foraging.	
Help Received Participant in the High School Honors Science Program, The Michigan State University. Supervisor: Dr. Zachary Huang of the MSU Entomology Department. Lab assistance: Dr. Kiheung Ahn and the MSU Apiculture Lab Group. Statistical Analysis assistance: Lisa Fu, MSU Apiculture Lab Group.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Jennifer J. Massa	Project Number S2012
Project Title The Effect of Feeding and Temperature on Anthropluera elegantissima Growth Patterns	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The effect of temperature and feeding on the growth rate of Anthropluera elegantissima was examined. Variation in polyp growth at several temperatures and feeding regimens was tested within the local range of temperatures and feeding times. Under experimental conditions polyps were tested in three trials that were conducted each with a different temperature and feeding regimen. Even though polyps appear to be able to acclimate to high temperatures they cannot sufficiently avoid shrinkage of tissues with higher water temperatures.</p> <p>Methods/Materials Twelve anemones were collected from an unprotected coast in la jolla caifornia. Four trials were conducted, the trials differed in that of the temperatures, one of 15, on of 20 one of 25 and one of 30.The anemones in tank one were fed once a day, tank two was fed once every other day and tank 3 was fed once every fourth day. The fourth tank was the control anemones which were kept at a constant temperature of 18-19 degrees Celsius and were fed once everyday. Through out experimentation wet Mass, dry mass and caliper diameter of the anemones mouths was collected. Trials lasted eight days with two day acclimation period in between.</p> <p>Results Possible explanations to my findings could include that the experiment was shortened vastly in order for time to permit. Maturity of the anemones could also result in irregular data reading since juveniles tend to grow faster. Further more additional investigations could include using longer extents of time for accurate results and using more test subjects to have a larger comparison between the experimental groups and control group. Since little is known about these marine invertebrates improved experimental techniques and design could provide more detail as to how the growth rate of anemones is impacted.</p> <p>Conclusions/Discussion The experimental groups were compared to a control group of anemones which remained at a water temperature of 18-19 degrees and were fed constantly every day. In trial one and two, mass change resulted in a positive growth, in trials three and four, mass change resulted in a negative growth. However there was no significant difference in caliper diameter readings in each trial even though the temperature varied from 15-30 degrees Celsius.</p>	
Summary Statement the effect of feeding regimens and temperature change was tested on aggregating clone anemones in order to determine their change in growth patterns and to discover if the water temperatures produced a negative or positive affect on growth.	
Help Received Teacher, Todd Linke, helped edit and revise notebook; Peers helped edit notebook ; Friends helped collect anemones; mother and father helped provide area for experimentation; friend helped design backboard.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Nicole N. Nakata	Project Number S2013
Project Title Hydroid Preference of Nudibranch Flabellina iodinea	
Abstract Objectives/Goals Nudibranchs are highly specialized feeders, consuming only a single genus or species of plant or animal. Hydroids are the preferred food source of most aeolid genera, of which the Spanish Shawl belongs. Several texts hold that the Spanish Shawl's food source is the sticky hydroid Eudendrium, and other are even more specific naming the species Eudendrium ramosum, but do not do so conclusively, but solely make note of the nudibranch's inhabitation of said hydroid. Hence, this experiment was conducted in order to ascertain the nudibranch's preference to the hydroid E. ramosum. Preference was determined by weight gain in the animals, and the disappearance of polyps from the hydroid branch Methods/Materials The nudibranchs were fed weekly, with weights taken the day of feeding, the day after, and one week later (before the next feeding). Weights were taken using a small petri dish filled with water, measured in grams. Since nudibranchs gain their coloring from the chemicals within their food, the Aglaophenia hydroid was soaked in astaxanthin, the pigment that causes the coloring in the nudibranchs, to make it more appealing. Results However, the nudibranchs showed no interest in the Aglaophenia hydroid and steadily lost weight. On the contrary, the nudibranchs fed the Eudendrium hydroid gained weight when weighed 24 hours later. The nudibranchs were often found grazing on the Eudendrium, whereas none were found on the branches of Aglaophenia. Conclusions/Discussion After comparing the weight changes in the two groups of nudibranchs, it is clear that Spanish Shaws prefer the hydroid Eudendrium. In addition to raising the nudibranchs, culturing methods for the Eudendrium were tested for the maintenance of the nudibranchs.	
Summary Statement My project was conducted to determine the food preference of the Spanish Shawl	
Help Received used lab equipment at Cabrillo Marine Aquarium under Dr. Kiersten Darrow	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Kenneth Pessino	Project Number S2014
Project Title Investigation into the Spatial and Temporal Patterns of Purple/Red Sea Urchins and Kelp Bass in the S. Barbara Channel	
Abstract Objectives/Goals My objective was to determine if there are spatial and temporal patterns of recruitment that vary among species. Also if recruitment differs between mainland and island site (Santa Barbara Channel). If there is a difference between the eastern and western Channel Islands, and how does the timing of recruitment differ among species. Methods/Materials I focused on Red and Purple sea urchins (<i>Strongylocentrotus franciscanus</i> and <i>Strongylocentrotus purpuratus</i>) for invertebrates, and the kelp bass (<i>Paralabrax clathratus</i>) for vertebrates. To collect sea urchins Tuffys and brushes were deployed on fixed mooring lines throughout the Channel Islands and mainland sites in the Santa Barbara Channel. Standard Monitoring Unit for Recruitment of Fishes or #SMURFs# were deployed in the same areas to collect juvenile kelp bass. The Tuffys, Brushes, and SMURFs are placed in the water for 2-4 weeks and then collected by the PISCO Dive Team. The samples were collected, identified and counted. All the data were recorded and analyzed. Results Through the data analysis process I found that the abundance of kelp bass increases on the islands when moving from west to east and also from south to north. The amount of juvenile kelp bass recruited from the mainland is significantly lower than that recruited at the Channel Islands. The sea urchin recruitment data is similar to that of the kelp bass. Mainland recruitment was lower than recruitment at the Channel Islands. Channel Island recruitment of sea urchins from east to west is a little scattered and not as uniform as that of the kelp bass pattern of recruitment. The recruitment on the eastern islands was also more than the amount on the west islands. Conclusions/Discussion My investigation shows that there are spatial and temporal patterns in the recruitment of sea bass and sea urchins in the Santa Barbara channel. The recruitment differs between the mainland and the island and from east to west of the islands. Also there is a very distinct peak for sea urchins during the months of May and June. For kelp bass a peak occurs during July, August and September.	
Summary Statement It investigates if there are spatial and temporal patterns of recruitment that vary among species in the SB Channel.	
Help Received Used equipment at the PISCO Laboratory in the Marine Science Institute, UC Santa Barbara.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Caroline K. Salmond	Project Number S2015
Project Title A Goldfish Never Forgets: Year Three	
Abstract Objectives/Goals Do goldfish contain long-term memory capabilities, or the ability to remember an event or occurrence, when put under the temperate effect of warming waters through operant conditioning? If I operantly condition eight common, household pet goldfish to associate a certain colored ring with a food reward, and then test them under different water temperatures, they will demonstrate faster recognition times in the cooler water than in the warmer water. Methods/Materials The materials needed for this experiment were: Eight (8) common goldfish, one (1) twenty-gallon aquarium, a filter, an aquarium heater, an aquatic thermometer, a light and tank covering, fish food (flakes), a stopwatch, three (3) Styrofoam rings, one tub, and one camera. 1. Acquire eight common goldfish. 2. Feed goldfish daily in seventy-degree water using three colored rings (red, yellow, and blue). Place food in red ring so that fish will eat out of red ring. 3. After several days of training the fish, test fish in tub with seventy-degree water. Place the three rings at the opposite end of the tub and record how long it takes each fish to recognize and swim to the ring (test each fish individually). 4. After two tests, change tank temperature to eighty degrees and continue feeding using training method with rings. 5. After several days, conduct two more tests in tub, this time with eighty-degree water temperature. Record time it takes for fish to recognize and swim to rings. Results Fish were slower in warmer water tests compared to cold water tests. Conclusions/Discussion My conclusion is that the goldfish have better memory and recognition skills in the colder water. I believe this is true because in warmer water, goldfish have higher respiration rates, which means they require more energy. This would slow down their overall swimming.	
Summary Statement The purpose of this project is to continue my study of the long term memory capabilities of a common goldfish and to determine if these capabilities are affected by differing water temperatures.	
Help Received Mother helped maintain fish tank.	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Jeannie N. Tran	Project Number S2016
Project Title Aromatic Effects on Calorie-Restricted <i>Gryllus bimaculatus</i>	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Caloric restriction, limiting an organism's caloric consumption, can increase certain organisms' lifespan. Many scientists hope that understanding caloric restriction may provide clues to slowing the aging process in humans, but recent studies in fruit flies have shown that olfactory stimulants may diminish caloric restriction's life-lengthening effect. Some scientists believe that only the odors of rich foods (foods that the particular organism might enjoy) will harm the effect of caloric restriction. The objective of this experiment was to test a set of olfactory stimulants and their effects on caloric restriction in <i>Gryllus bimaculatus</i> (a species of field crickets) and deepen the understanding of when and how caloric restriction might prolong lifespan. The hypothesis was that the odors of foods that crickets are regularly attracted to would diminish caloric restriction's life-lengthening effect.</p> <p>Methods/Materials In this experiment, crickets under various conditions were raised over a period of four to five months in separate habitats. The crickets were raised either on or not on a calorie-restricted diet and were either exposed to or not exposed to an odorant stimulant.</p> <p>Results Crickets on a calorie-restricted diet and not exposed to any of the tested olfactory stimulants were found to have a lifespan that was at least over 20 days longer on average when compared to the control group. Most of the olfactory stimulants tested significantly shortened the average lifespan of crickets on calorie-restricted diets.</p> <p>Conclusions/Discussion This experiment provides data that odors may have a noteworthy effect on caloric restriction. Further study of the olfactory system could lead to underlying mechanism that causes lifespan extension in calorie-restricted organisms and could answer the question as to how caloric restriction can be used for humans' advantage.</p>	
Summary Statement My project's objective is to test how olfactory stimulants affect the life-lengthening effect of caloric restriction and to determine whether the olfactory system may contain clues as to how to slow down the aging process in humans.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Whitney J. Yankauskas	Project Number S2017
Project Title Predator Avoidance of Pachygrapsus crassipes Due to Moving Shadows	
Abstract Objectives/Goals The point of this experiment was to see if there was a significant difference in the behavior of a lined shore crab that was subjected to an inconsistency of light caused by moving shadows. The behavior was assessed by how many times the lined shore crabs exited their shelter, entered the water, and how long they stayed outside of their shelter, while they were subjected to moving shadows. Methods/Materials I tested four groups, three crabs in each group, twelve times. One group was subjected to a 1 minute interval shadow(1 minute on, 1 minute off), one group was subjected to a 5 minute interval shadow(5 minutes on...then off), one group with a shadow on for the entire testing time, and one group with no shadows for the testing time. Materials used were an incandescent lamp, lined shore crabs large white paper, a 3.3 cm by 2 cm plastic box, a petri dish, and rocks, sand, and sea water. Results When taken into statistics, there was a significant difference when comparing the control group to the rest of the groups, except when it came to time spent outside. The 1 minute group crabs spent the least time outside, had the least shelter exits and the least water entries. Conclusions/Discussion My results supported my hypothesis, and my null hypothesis could be rejected.	
Summary Statement My project was about how a lined shore crab perceived what type of shadow is more threatening	
Help Received My dad drove me to the beach to get the crabs. Used equipment from the science building.	