



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Thomas Adams; James Spriggs; Zackary Wambaugh	Project Number S2201
Project Title Men with a Lot of Mussels Part 2: Revenge of the Turban Snails	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our goal is to explore the biodiversity of the Davenport Landing tide pools along a pre-established vertical transect. Our investigative question is: How will a plot's abundances of organisms vary with respect to the plot's biodiversity along the Davenport vertical transect? Our hypothesis is: a site's biodiversity has an inversely proportional relationship to mussel presence within the mussels in the mussel's intertidal range; a site's biodiversity also has an inversely proportional relationship with turban snail populations in the turban snail's intertidal range.</p> <p>Methods/Materials We have been monitoring the vertical transect, established in 2002, twice a month (as conditions allow) during low tides since June 2010. We measure wind speed, tides and temperature. Then using permanent eyebolts, we secure a tape measure and center a quadrat over the transect every 3 meters out to 21 meters. Following LiMPET'S protocols (Long-term Monitoring Program and Experiential Training for Students), we count and record the abundance of 30 species of invertebrates and algae in each quadrat and also note bare rock and sand. After we collect the data, we find the counts and proportions of the organisms, and find the biodiversity using the Shannon-Weiner Index, which finds the biodiversity using both species richness and total richness.</p> <p>Results Our results showed that plots within the upper tidal zone and with extreme amounts of turban snails and mussels had lower biodiversity compared to the plots with more moderate amounts of turban snails and mussels. This indicates an inversely proportional relationship between mussel abundance and turban snail counts.</p> <p>Conclusions/Discussion We have concluded that in support of our hypothesis, there is an inversely proportional relationship between a site's biodiversity and both mussel presence and turban snails within the mussels and urban snails respective tidal zone (upper tidal zone / splash zone. We believe this is in part due to the fact that mussels are very competitive for the abiotic factor of space which prevents other invertebrates and algae from inhabiting that space. As for turban snails, this inversely proportional effect with biodiversity, we believe, is due to great amounts of turban snails at some plots consuming many of the algae reducing biodiversity.</p>	
Summary Statement Our project is about monitoring the health of the tidepools at Davenport Landing State Beach by looking at the biodiversity and populations with respect to turban snails and sea mussels.	
Help Received We would like to thank our mentor Dr. John Pearse, Professor Emeritus, UCSC, and SLVHS.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Madaly Alcalá	Project Number S2202
Project Title Zooplankton Biodiversity Comparison	
Abstract Objectives/Goals It is important for zooplankton, especially meroplankton, to have a sustainable environment to spawn, reproduce, and develop. Distribution of plankton in the ocean is dependent upon many factors such as intensity of light, time of day and night, salinity, temperature, turbidity, currents and tides, nutrients, season reproduction cycles, and predators. An ideal safe location for plankton is a salt marsh, which is semi-sheltered, and often serves as nursing grounds for young marine life. Therefore, the biodiversity of the man-made salt marsh should be greater than the surrounding coastal due to the environmental conditions there. Methods/Materials 12 Trials of data collection from the man made salt marsh and the Cabrillo boat launch. At each location: the temperature of the ocean water was taken with a thermometer, the salinity was also taken using a refractometer. A 25 micron plankton tow was used to collect the plankton. After both zooplankton beaker samples were collected, each was strained through a 35 micron mesh to condense the plankton in a smaller amount of water. After both were strained, it was processed into a Bogorav tray using a pipette, using 6mL at a time. The tray was put under a dissection microscope and the meroplankton were morphologically identified and tallied by phyla. Results The results showed that the boat launch had more biodiversity of meroplankton. The Shannon Weaver index was used to find the index, or biodiversity, of each collection day; the bigger the index the greater the biodiversity, not because of a greater amount, but because of a greater evenness amongst the organisms. A grand average was created from all the indexes for each location, the marsh averaging a 1.06 index and the boat launch averaging a 1.16 index. This indicates a slightly less competition between species at the boat launch and a competition that has narrowed down the amount of species able to make a living at the mad-made salt marsh. Conclusions/Discussion The salt marsh should have been more diverse because it is supposed to serve as a natural nursery for larval organisms; but there was a sewage spill in the marsh on July 20th, seven days before the first collection. The results may be an indication that the sewage spill did affect the marine life held within the marsh; which goes to show that the city of San Pedro has to take initiative to fix the sewage drains and where they drain out.	
Summary Statement The fate of plankton populations is dependent on a stable environemnt, which the man-made salt marsh at Cabrillo Beach has neglected to protect.	
Help Received Mentor: Adrienne McColl	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Christine Chen	Project Number S2203
Project Title Assessing Polioptila californica Population in Differing Artemisia californica Habitats, Year 2	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This purpose of this project is to study the California gnatcatcher(Polioptila californica)bird population in a newly restored California sagebrush(Artemisia californica)habitat versus that of a mature habitat. The California gnatcatcher is federally listed as a endangered species and is especially threatened due to the depletion of their native habitat, the California sagebrush. This year, I also correlated the habitat growth with the bird population data. Therefore, for this project, I hypothesize that with an increase of plant growth at the newly restored habitat, the California gnatcatcher population at the newly restored site will also increase</p> <p>Methods/Materials I conducted bird surveys in which I counted the number of birds at two different reserves- a mature site and a newly restored site. Data collected during this years' time frame along with the data collected last year were both used in statistical analysis. The surveys at each reserve were conducted at two stations in the morning, and exactly 10 minutes long, where all visible, and audible California gnatcatchers within a 75 meter radius were counted and recorded. I also collected measurements of the California sagebrush within 6 month intervals at both sites to assess the growth of each habitat.</p> <p>Results The observations noted in my research and the statistical analysis using an ANOVA test, Multiple Comparison Chart and Mann Whitney Rank Sum Test demonstrate that the growth at the newly restores site has a correlation to an increase of abundance of the California gnatcatcher at the newly restored site.</p> <p>Conclusions/Discussion These results are significant as they demonstrate the gnatcatcher utilizing the newly restored habitat after two years, much earlier than what is expected. The observation of two gnatcatchers teaching their juvenile gnatcatchers how to forge gives me the confidence to predict that as this land reserve continues to mature, the California gnatcatcher population will eventually match that of the mature habitat.</p>	
Summary Statement This project was conducted to see if continual growth of the California sagebrush, a vital species for the California gnatcatcher, would have a correlation to any increase of abundnace of the California gnatcatcher.	
Help Received Conducted research at land reserves that belong to the Palos Verdes Peninsula Land Conservancy. My mentor, Ann Dalkey, helped oversee my project	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Julian O. Kimura	Project Number S2204
Project Title Copepod Culturing: Conditions and Designs for Maximum Yield per Generation, Year 2	
Abstract Objectives/Goals Copepods are essential food sources for captive marine animals. However, due to their slow reproductive rate in laboratories, copepods are not a viable food source for some organisms. In addition, pelagic copepods are notorious for their delicateness and cannibalism, resulting in difficulty when producing large volumes. Previously, culture conditions for the species <i>Tigriopus californicus</i> were explored, resulting in a 260% increase in copepod population by feeding <i>Isochrysis</i> algae. This year, the effects of DHA and ARA, the two major HUFA components of <i>Isochrysis</i> , were compared. In addition, a specialized tank that solves for all problems associated with culturing pelagic copepods was designed. Methods/Materials Trials testing fatty acid diets lasted four weeks. Cultures were 5gallon buckets with an air pump, starting off with 100 gravid females of <i>T. californicus</i> . Every two weeks, water was agitated to keep copepods in suspension, and three 20ml samples were taken. The average of samples was used to estimate the population. Tanks were built for the pelagic species <i>Acartia tonsa</i> using a fiberglass container as a base. PVC piping with 45 and 150 micron mesh was used for automatic adult and nauplii separation. Results Cultures fed on high DHA diets yielded 37% more than those fed a combination of the two HUFA#s, and 80% more than those fed ARA. <i>A. tonsa</i> tanks successfully separated nauplii from the adults with steady parameters. Conclusions/Discussion The data suggests DHA components in copepod diets over doubles the population per generation. Moreover, the <i>A. tonsa</i> tank increased the ease of culturing pelagic copepods.	
Summary Statement Copepod reproduction in laboratory cultures was maximized by manipulating diet and environmental factors.	
Help Received Parents gave me transportation to and from the aquarium; Mr. Starodub guided me through the scientific method; Dr. Kiersten Darrow allowed me to use her facility.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Haley A. Korenak	Project Number S2205
Project Title Do the Pink Flamingo Limp?	
Abstract	
Objectives/Goals The purpose of this project was to be able to determine if the flamingo exhibit at the Fresno Chaffee Zoo needs heaters covering the area during the colder months due to what is characterized as "seasonal limping".	
Methods/Materials The first component to my project was to arrange several weeks to meet with the veterinarians, trainers, and employees at the education department at the Fresno Chaffee Zoo. I spent a few weeks observing the American Flamingos then started my project. I spent at least one hour for 3 days a week for 25 days in which I charted the temperature, humidity, and precipitation of each day. I collected information on which flamingos were limping each day. I looked at each flamingo individually in order to receive my data. I also charted down the leg each flamingo was limping on. For any other information, I placed it in the notes column.	
Results "Seasonal limping" in the American flamingos can be correlated to temperature and precipitation but not humidity. The temperature in the San Joaquin Valley is usually moderate but is lower during the colder months. These months include December, January, and February. The lower the temperature, the more flamingos limp. There was not a close relationship between the American Flamingos limping and the Humidity. The Humidity varied because of multiple factors, and could not be matched to seasonal limping in the higher or lower humidity percentages. The higher the precipitation, the more flamingos limped. It seemed there were more flamingos limping the higher the precipitation. Also, during the colder months in the San Joaquin Valley, the temperature is usually lower when there is higher precipitation	
Conclusions/Discussion From this observation I can conclude, #seasonal limping# in the American Flamingos at the Fresno Chaffee Zoo can be correlated to temperature and precipitation but not humidity. I can also conclude it would benefit the flamingos to have a heated system over their habitat but is not necessary due to the lack of extreme low temperatures in the San Joaquin Valley.	
Summary Statement I correlated what is known as "seasonal limping" in the American flamingos at the Fresno Chaffee Zoo to temperature, humidity, and precipitation to see if it would benefit the flamingos to build a heating system over their habitat.	
Help Received The veterinarians, employees, and trainers at the Fresno Chaffee Zoo for providing an area to complete my project	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Bianca G. Landfield	Project Number S2206
Project Title The Plus Sign Trial: A Test of Cognitive Mapping Ability in Hermit Crabs	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this research is to determine if geometric or featural modules are more important in the cognitive mapping abilities of hermit crabs.</p> <p>Methods/Materials A black, wooden plus sign with darkness at the end of one arm and nothing at the end of the opposite arm was used in three different phases of this experiment. The hermit crabs starting position and the location of the darkness with respect to the plus sign were rotated in specific ways in each of the phases of the experiment to determine whether geometric or featural modules in the brain are more active when hermit crabs cognitively map out their environments.</p> <p>Results The average initial time it took the hermit crabs to reach the darkness in each trial was graphed, with interesting but inconclusive results. The average number of hermit crabs that reached the darkness in each trial was also graphed, with an interesting result: less hermit crabs reached the darkness in phase three of the experiment, when the location of the cloth was rotated.</p> <p>Conclusions/Discussion The results do not lead to any immediate or obvious conclusions, but the disruption in phase three of the experiment was an interesting result that I will be exploring further.</p>	
Summary Statement This project tests whether geometric or featural modules in the brain are more active when hermit crabs cognitively map out their environments.	
Help Received I worked in a lab in the UCLA Department of Psychology, with a visiting professor, Dr. W. David Stahlman, as my mentor.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Saige J. Manier	Project Number S2207
Project Title Jumping Galls: A Novel Mechanism for Motility	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In four experiments, my goals are to determine why the galls jump, at what optimum temperature range, how much energy do the galls require to jump/how do the galls jump (with a model), and how far can the galls jump? This research could be applied, using the same principle of momentum transfer, to develop a landing rover for Mars which has no external moving parts, using fuel efficiently.</p> <p>Methods/Materials Materials: 1: Sensing humidity: *30 galls, 3 Petri dishes, wash cloth, calcium carbonate, thermometer. 2: Optimum temperature: 10 galls, a pan, petri dish, water, ice. 3: Energy, jumping mechanism, model: $E=mgh$, calculator, mousetraps, fishing weights, ruler. 4: jumping distance: calculator, photographs of galls jumping at 5, 1 min intervals. Methods: 1: Can galls sense humidity? Measure the jumping rate of the galls at one minute intervals. 10 galls in each of the following environments: dry (created by calcium chloride in the petri dish), humid (created by a washcloth soaked in water), and control 2: Optimum Temperature. *Record jumping rate/min beginning at 0°C and continuing at intervals of 5°C. 3: Energy, Jumping Mechanism, Model. Test hypothesis. Using the model, measure distance that the mousetrap will jump using different amounts of weight. 4: How far can a gall jump? * Use photographs to find distance galls jump/min, multiply by length of galls jumping cycle</p> <p>Results Galls jump at a higher rate in dry environments than humid environments. Galls do not jump below 20°C. The jumping rate increases until about 30-35°C, where it begins to level off. Each gall must contain 1.857×10^{-7} g fat to jump for the duration of its life cycle. I compared this to the result that each gall contains 6×10^{-3} g fat. Galls use fat to jump through momentum transfer. (see model) Galls can jump for over a mile.</p> <p>Conclusions/Discussion Galls jump at a high rate in dry environments, most likely to avoid drying out. Galls do not jump at all below 20°C, which means galls are active primarily during the day when the temperature is above this threshold. Each gall has ample fat to sustain an above average jumping rate for its lifetime. Galls jump by</p>	
Summary Statement The purpose of this project is to learn more about how and why the <i>Neuroterus saltatorius</i> (Jumping Oak galls) jump, and to apply these findings to the construction of an extremely fuel efficient vehicle without any external moving parts.	
Help Received David Deamer, Professor Emeritus of Chemistry at UCSC, gave advice on experiments (primarily email), helped with editing report, assisted with the graphs, and provided some experimental materials.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Mark T. Nakata	Project Number S2208
Project Title Use of Attractants in Mosquito Control: A Study of Color Affinity in Anopheles gambia Larvae	
Abstract Objectives/Goals The purpose of my experiment is to determine if the Anopheles gambia mosquito larvae's ocelli have the capability to detect color by measuring its affinity to certain colors. If successful, this behavioral trait can be manipulated so that the larvae can be effectively trapped. Methods/Materials I drew four 7.5cm circles in three trays. I put a black, red, green, and white 1 cm cubes in each circle. I transferred 200 1st instar mosquito larvae into each tray. I recorded the larvae's movements for 30 min. I reran the test with 2nd-3rd and 4th instar larvae. I stopped the film at 1 min. intervals and recorded the number of larvae inside the circles. Next, I ran a two color comparison test using 75 2nd-3rd instar larvae. I compared white/white, white/green, white/red, and green/red. Results During the 4 color comparison tests, the 2nd-3rd instar larvae display an affinity for the colors green and red. The 4th instar larvae show an aversion to green. The results of the two cube comparison tests show that the 2nd-3rd instar larvae are more attracted to the colors green and red than white. But, when the red and green cubes were compared, the larvae prefer green. The graphs of the 2nd-3rd instar results indicate a strong attraction during the first 10 min, followed by a rapid decrease. Conclusions/Discussion The data supports my hypothesis. The 2nd-3rd instar larvae show an ability to detect the colors green and red. The results of the two cube comparison tests confirm that the 2nd-3rd instar larvae are most attracted to the color green. The results show that the Anopheles gambia mosquito larvae's ocelli have the capability to detect color and are strongly attracted to the color green. Mosquito borne illnesses cause over 3 million deaths per year; thus, it is imperative to discover new behaviors that can lead to non-toxic effective mosquito control.	
Summary Statement My project examines whether Anopheles gambia mosquito larvae's ocelli have the capability to detect color by running a series of color affinity tests on larvae in different stages of development.	
Help Received Used lab equipment at UC at Irvine under the supervision of Dr. Joshua Hartsel; Mom helped assemble backboard; Dad paid for everything.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Yi Jung Robin Park	Project Number S2209
Project Title Racial Discrimination in Ants: Effects of Cohabitation in Behaviors of Linepithema humile and Prenolepis imparis	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to test whether ants of two different species could be made to coexist peacefully with members of the other species.</p> <p>Methods/Materials 60 members of each species, <i>L. humile</i> and <i>P. imparis</i>, were collected. 20 <i>L. humile</i> ants and 20 <i>P. imparis</i> ants were placed in separate environments that were recreated to represent each of their natural habitats. 20 members of each species were then intermixed in an environment that was recreated to suit <i>L. humile</i> ants. The remaining 20 of each species were intermixed in an environment that was recreated to suit <i>P. imparis</i> ants.</p> <p>Results Within their own habitats, both ant species were mobile and interactive. In the habitat that favored <i>L. humile</i> ants, the <i>L. humile</i> ants first segregated themselves into a small area of the container and avoided interactions with the widespread <i>P. imparis</i> ants. After a period of three days however, the ants achieved a peaceful coexistence. In the habitat that favored <i>P. imparis</i> ants, the <i>L. humile</i> ants remained scattered and immobile, refusing to touch the nesting substrate. The <i>P. imparis</i> ants killed all of the <i>L. humile</i> ants within 17 hours.</p> <p>Conclusions/Discussion Prolonged exposure to environmental substances causes changes in an ant's Cuticular Hydrocarbon Composition, the main nestmate recognition tool among ants. The uneven distribution of chemical cues is shown in the greater hostility expressed by <i>P. imparis</i> ants in the second environment, in which the <i>L. humile</i> ants refused to touch the nesting material. It can be stipulated that greater dominance is asserted in familiar habitats rather than in foreign ones.</p>	
Summary Statement Peaceful coexistence between two ant species during cohabitation can only be established when they are placed in a habitat that is recreated to suit the less dominant species.	
Help Received Dr. Phil Ward of UC Davis helped confirm the species of ants via email and photos; Mother helped take photos of the ants	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Shivam D. Patel	Project Number S2210
Project Title The Effect of Algae Species on the Growth of Brine Shrimp	
Abstract Objectives/Goals The objective of this project was to find out that which algae species has the most affect on the growth of brine shrimp. Methods/Materials In this experiment, brine shrimp were hatched and raised into their adulthood. Then they were fed three different species of algae over a period of fourteen days. There were three trials for every species of algae. The fish bowls in which the brine shrimp were kept were cleaned every 2-3 days. There was a major problem while I was conducting this experiment. The scale that I was using to measure the mass of the brine shrimp was not properly calibrated, so I had to redo my experiment. Because of this problem, I could not collect enough data. Instead of collecting the data over a period of fourteen days, I could only collect data for six days. Conclusions/Discussion My hypothesis was "If the species of algae affects the growth of brine shrimp, then the softer and single celled algae will increase the growth rate of brine shrimp." According to my results, my hypothesis was right. Dunaliella (Green Algae) was the species of algae that was mostly consumed by the brine shrimp. Cyclotella (Diatoms) was the second most consumed algae, and spirulina (Cyanobacteria) was the third most consumed algae by the brine shrimp. A problem occurred while I was conducting my experiment. The scale that I was using to do my experiment was not calibrated. So since I had to redo my experiment, I did not have time to collect enough data. If I were to redo this experiment I would then have to find a way to get rid of the extra water that I was adding to the scale with the brine shrimp.	
Summary Statement This project is about discovering which species of algae has the most affect on the growth of brine shrimp.	
Help Received Mr. Young helped me out by providing me with the algae species that I needed. Mr. Sanders and Mr. Dowling helped me with some of the research.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Michael A. Salmond	Project Number S2211
Project Title When Half a Worm Is Not Enough, Year 2: A Planaria's Regeneration and Growth Rate under Different Magnitudes of Light	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals If I expose Planaria to either complete darkness, bright light, or naturally occurring light, will the amount of growth and regeneration be impeded?</p> <p>Methods/Materials I ordered approximately 60 Planaria. I placed the five Petri dishes that were being affected by bright light underneath a lamp which remained on the entire time. I placed the dark Petri dishes under a shoebox in order to prevent light from entering. I immediately placed the Planaria in a metal pan with spring water. I fed them a yolk of an egg the size of a pea. I filled each Petri dish with 1/2 cup spring water and one by one bisected 45 of the Planaria. Each cut was made below the nucleus. I took the measurements of each part of the bisected Planaria and the whole Planaria on Day 1. I placed lids on each dish to prevent evaporation. Each day for 2 weeks I changed 1/2 of the water in each Petri dish by extracting 35 mL using the baster and replacing it with 35 ml of fresh water. I also measured each part and whole Planaria and recorded them. To measure the Planaria, I used an instrument called a micrometer caliper. I used tabletop magnifier with a light as well as a desk light. I counted the total number of full Planaria in dishes containing bisected Planaria to see if any had regenerated completely. #60 Planaria#Ice#Scalpel#Spring water#15 shallow containers with lids#Micrometer Caliper#Eyedropper#Tweezers#Table Magnifier#Hardboiled eggs#Cooking Baster#Labels#Two shoe boxes# Light Source</p> <p>Results The Planaria in the constant light had the greatest growth, however, they had a slower regeneration rate than the planaria in the natural light. The Planaria in the darkness had the slowest regeneration rate and the least growth out of all three. The natural light had the fastest regeneration rate and a normal growth rate.</p> <p>Conclusions/Discussion The growth of the Planaria when under constant light could be attributed to the fact that they were always moving. The light sensors on they heads allow them to move and see and because the Planaria in the dark had no light they could not move which resulted in them doing nothing for two weeks. The natural Planaria may have had the best regeneration rate because they were living in their adapted conditions and they were simply reproducing whereas the light and dark lights caused the Planaria to adapt to new conditions.</p>	
Summary Statement My project was to determine if different magnitudes of light such as light, dark, or natural, impede or promote Planaria regeneration and growth rates.	
Help Received Mother helped provide supplies for poster; father helped provide supplies for experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Tyler G. Urban	Project Number S2212
Project Title Fringed Families: A Study of the Phylogeny of the Mojave Fringe-Toed Lizard through Morphology, Geology, and Genetics	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Because of the Mojave fringe-toed lizard's strict habitat requirements (sand with scrub hummocks [Aeolian specialists]), many separated populations are in threat from human activities. Therefore, the objective was to investigate the phylogeny of four separate populations of <i>Uma scoparia</i> in the Mojave Desert and to suggest conservation action if necessary.</p> <p>Methods/Materials Lizard nooses, a terrarium, a ruler, satellite maps, prior similar research projects' results, and a gene decoding website were used. Seven lizards were collected from the Mojave Desert at four different locations. Morphology was examined in each specimen using a defined set of reference points. For geology, a geologist was consulted and evaluations of the terrain (barriers/corridors) were drawn from maps as well as geologic history. The genetic information observed in the diagrams from the prior studies and also seen in a re-analysis of the population sets of gene codes submitted to a Genbank.</p> <p>Results Of the 9 points of reference used to compare the specimens' morphology, 3 (#of supralabial scales, the # of ventral tail spots, # of front toes with fringe) exhibited similarity, 2 (inguinal spots, ocelli distinction) exhibited plausible difference, and 4 exhibited direct difference. The confirmed differences in patterning resided in the references of the # of throat crescents, the # of ventral pelvic spots, the presence of tibial banding, and the actual permanent color shade. The geology data supported the population separation hypothesis in showing that 1 of the 4 locales was physically isolated. The DNA comparison of the gene sets in the outside study revealed that three locations on and north of the Mojave River were all close enough in relation to be grouped into one clade of the Mojave River Drainage. The Cadiz location was grouped only with one other place tested in the other study in a distinct clade originating back to the base relation break.</p> <p>Conclusions/Discussion The morphology data and geographical separation show measurable differences in appearance and absence of contact between some populations of the species <i>Uma scoparia</i> in the Mojave Desert. Therefore, it's clear that the population segments are distinct but yet unknown as to what degree of difference there is in phylogeny.</p>	
Summary Statement A study that observed the phylogeny of <i>Uma scoparia</i> through morphology, geology, and genetics.	
Help Received Prior studies were researched for information with relevance to this study.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Katia A. Mafra Spencer	Project Number S2299
Project Title Cockroach Push and Pull	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to determine if plant extracts can be used to modify the behavior of German cockroaches, <i>Blatella germanica</i>.</p> <p>Methods/Materials A two-choice test was performed to determine the effect of a treatment as a behavior modifier. A Petri dish with two dollops of 15mg food, received a dollop of the Treatment formulation (SPLAT with either Guava, Clove, Savory, Peppermint or Control) on one side and the Control on the other. The five treatments were replicated six times. Four roaches were released in the center of each Petri dish. Twelve hours later the position and the physiological state of each roach was determined.</p> <p>Results The data indicate that: 1. The bioassay showed no bias to roach position due to external conditions. 2. 92% of the cockroaches congregated on the opposite side of the Savory dollop, suggesting a strong repellent effect. 3. 71% of the cockroaches chose the Guava extract; 79% rested on top of the dollops, showing a very strong attractant and/or arrestant of German cockroaches.</p> <p>Conclusions/Discussion My original hypothesis was that Guava would be the strongest repellent of <i>B. germanica</i> was proven wrong. To our surprise Savory was the most repellent treatment, whereas Guava proved to have a strong attractant and/or arrestant effect on German cockroaches, contrary to all previous literature.</p> <p>Most conventional insecticides used for roach control have deleterious effects on non-target species, including humans. The results from this Science Fair project could help in the design of more benign, environmentally safe, German cockroach control through a #push and pull# management solution. Our data indicate that German cockroaches not only were attracted, but also were aggregated and arrested on top of the guava extract dollops (pull), whereas Savory had a strong repellent effect (push). Savory can be used to push the roaches out of a certain area without the need of conventional insecticide. A combined pull strategy, with the guava extract, can be used to lure the cockroaches to less sensitive areas where the application of insecticide might be more acceptable, or where the guava extract is combined with small doses of a selective contact insecticide. This push and pull strategy could result in less use of insecticide while still obtaining similar, or perhaps even better, suppression of cockroach populations than currently</p>	
Summary Statement In a choice bioassay, German cockroaches are strongly attracted to Guava extract and strongly repelled by Savory extract.	
Help Received Katia Mafra Spencer used lab equipment at the Department of Chemistry and Department of Biology at ISCA Technologies, Inc. Received assistance from Lisiane Zeni with scale usage, father Agenor Mafra-Neto assisted in experimental design and sister Margot Mafra Spencer helped with microscope	