CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Aram Z. Angelo

Project Number
S2401

Project Title
The Amazing Gecko

Abstract

Objectives/Goals
My projects purpose was to use two geckos & test their vertical running time on 7 surfaces with added conditions. I added 2 more surfaces and changed the pH factor of the rain water. Various trial & error methods were used to get the geckos to run up a straight line. I e-mailed Professor Autumn & interviewed Dr. Yazejian, Mount Saint Mary#s College. I came up with the idea of imitating tropical wind by using a blow dryer. I also made sure they didn#t get tired; after three months of testing, I finished my trials with 7 trials for each surface and condition & ended up with 310 trials.

Methods/Materials
Tokay Geckos, Engineered Wood, Spring Scale, Bark, Rain & Ocean Water, Leaf, gloves, Rock, Band-Aids, Glass, Running Lanes, pH Measuring Kit, Plastic, Grass (skirt), Stucco, Twine Rope, Stopwatch, Blow Dryer, Measuring Tape
Before I started, I spoke with a Veterinarian to get safety approvals. I redid all my force tests, then began testing for my new project. After trial and error, I found it hard to keep my geckos to run an upward straight direction. I created a lane. The surfaces I used were engineered wood, leaf, glass, bark, rock, stucco, & plastic. I added rain water & ocean water to the surfaces. I put my gecko#s at the bottom of the surface & made them run up 6 feet.

Results
After repeating last year's force test for consistency, I concluded that glass & leaf did the best. After studying my 10 test results on 7 different surfaces with the varied conditions, On average under normal conditions, the geckos had the best running time on the engineered wood (5.59s), with the added 6.0-7.0 pH rain: glass (14.25s), with the added ocean water condition, pH 7.0-8.0 (13.9s). With all the added conditions combined, my geckos had the best running time on engineered wood (13.0s).

Conclusions/Discussion
My hypothesis of geckos having the best vertical running time across glass opposed to other surfaces/conditions was false. My results showed that the running time of a gecko depended on the surface and its condition. Engineered wood had the best running time. With rain water, 6.0-7.0 pH, they had the best running time on rock. With rain water, 7.0-8.0 pH, my geckos had the best running time on the rock. With ocean water, with 7.0-8.0 pH, on each of the same surfaces, they had the best running time on the bark. My studies of all conditions combined on each of the 7 surfaces, engineered wood was the best result.

Summary Statement
In 2008, I tested the adhesion force of a gecko's foot pads, and in 2009, I calculated the running time and speed of two geckos over various surfaces.

Help Received
Interviewed Dr. Molnar, Veterinarian for gecko safety, communicated with various professors listed in articles i read; and mom drove me around

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Courtney Baird; Morgan Slater

Project Number
S2402

Project Title
Flying Rats

Abstract

Objectives/Goals
Do seagulls connect people with food?

Methods/Materials
Materials
Finger Foods
Recording Log
Camera
People (on some tests)
Brown bags
Watch

Results
on graph

Conclusions/Discussion
Conclusion
We discovered that seagulls are very lazy and only landed when they saw easily accessible food. For our first test we had no food and no people, and assumingly there was only one to two seagulls that flew by in the course of 30 minutes. For our second test we had only food in brown paper bags. Unlike our prediction, after around 10 minutes the food was discovered and seagulls rapidly flew in. Within minutes there were around 50 seagulls landed in the quad. Our third test consists only a small group of people. We noticed that there were about 4 that flew over but most watched and waited on the roof -tops, but once the food was out seagulls began to land. In 5 minutes there were around twenty seagulls total. The most surprising test consisted of a large group of people with food (a school day lunch). We predicted that this test would have the most seagulls but we realized that seagull#s only land when they know food is easy to get. There were several seagulls flying around but there fear of people causes them not to land. Overall our hypothesis was somewhat right, because seagulls do use people as a target for food, yet if people patrol their food, it is probable that no seagull would land to capture your meal.

Summary Statement
For our sWe are studying if seagulls connect people with food and are testing this by recording if seagulls come when: people have food and brown bags, there are just bags with no food, there are just bags that have food,

Help Received
Friends and family helped by agreeing to be the bodies to make our experiment more accurate.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Andrew Chen; Trenton Ramos

Project Number
S2403

Project Title
Scents of Direction

Abstract

Objectives/Goals
Our underlying goal of the entire project was to find a non-toxic, environmentally safe, pheromone based ant repellent.

Methods/Materials
We tested for the existence of each main pheromone (i.e. positive - "food-marking"; negative - "no entry"; panic pheromone) separately to observe its effect on the ants and to use this qualitative data as a foundation upon which to base the remainder of our experiments. To test, we used a trail bifurcation fork to study behavioral patterns in response to the variable stimuli placed upon the ants. Further hybrid tests matched first two at a time, then all three of the pheromones to judge comparative strength. Thirdly, we analyzed our observations and chose to further investigate each of our pheromones in a pest control scenario.

Results
Trends in our data proved the existence of the positive, negative, and panic pheromones - the first stage of our experiment. In the positive pheromone tests , a large initial number of ants crossed the positive pheromone paper while less crossed the control paper, showing that there was a force of attraction on the positive paper. The negative pheromone test showed that the negative pheromone existed because more ants consistently went up the control paper side. The panic pheromone was proven to exist because ant behavior changed drastically when they experienced a stress and once coming into contact with other ants, saw a spread in the panicked behavior. In testing pheromone strength, we found the negative pheromone to be stronger than the positive pheromone and the panic pheromone to be strongest - while ants were exhibiting behavior designated to the positive and negative pheromones, their instructions were easily overwritten by instructions from the panic pheromone.

Conclusions/Discussion
Thanks to the recent works of the University of Sheffield and other giants, we can see with new clarity the potential importance of pheromone zoology. We found that an elegantly simple solution to the balance issue between pest and human can be found in the ant's own glands, in the form of a foraging efficiency boosting negative pheromone. If this pheromone can be isolated and identified, we may usher in a new era of pest control, where the offenders are not harmed, and humans act as benign inhabitants of the world, not the sole rulers of it.

Summary Statement
Using arrays of bifurcation forks and manipulative stresses, we tested the traits and existences of three pheromones of Monomorium pharaonis, their interaction in creating a system of communication, and their ability to replace ant poison.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

David Franck; William Lawton; Chad Townsend

Project Number

S2405

Project Title

Birds as Indicator Species

Abstract

Objectives/Goals

The purpose of our monitoring project is to raise environmental awareness of an ecosystem's health by using riparian birds as indicator species. We monitor two sites, the Covered Bridge Park -- a riparian site heavily impacted by urbanization -- and the Zayante Trail -- a pristine riparian habitat. We hypothesize that urbanization has affected the riparian bird species at the Covered Bridge more than those at the Zayante trail.

Methods/Materials

Using binoculars, a wind/temperature gauge and a record sheet we observe the bird populations of Felton's Covered Bridge Park as compared to Zayante Trail. Twice a week we visit our sites and document observed birds by sight and call.

Results

By analyzing our data through the use of a chi squared analysis, we were able to determine that our results show a significantly larger number of urbanized bird species, such as the European Starling and the Brewer's Blackbird, are found at the Covered Bridge park. We have also found that a large number of native riparian species, such as the Yellow-rumped Warbler and the Wood Ducks are more abundant at the Zayante trail site.

Conclusions/Discussion

Our results from the chi square analysis, observation data, and site maps lead us to believe that because the Covered Bridge Park is more heavily impacted by anthropogenic influences because species favoring these conditions are more prevalent. The proportionally high number of urban adapted bird species and low number riparian species sensitive to urbanization suggests that our hypothesis is correct. Our findings also confirm that the Zayante Trail site is pristine in comparison; we spotted few urban adapted birds and a proportionally greater number of riparian birds. We believe that the discrepancies between the bird populations found at the Covered Bridge Park and Zayante Trail are caused by increased urbanization at the Covered Bridge Park. This could affect the utility that the public park gives the residents of Felton negatively because of the increased stress on the Covered Bridge Park ecosystem.

Summary Statement

Our focus for this project is to compare two disparate ecosystems using riparian bird species as indicators of environmental health

Help Received

Parents with ransportation, David Suddjian helped get us started on the Zayante Trail site, Jane Orbuch helped motivate and encourage the growth of our project

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Kevin D. Jordan

Project Number
S2406

Project Title
Global Impacts of Rising Aquatic Temperatures on the Survival of Carassius aurutus

Abstract

Objectives/Goals
The test provided and was based on the idea that increasing temperatures of aquatic environments affect fish's abilities to survive. To replicate their environment for the particular situation, the fish were put through series of mazes in which they were motivated by a food stimulus at the end of the maze. The survivability of the fish was monitored to see the time it took to complete each maze with the designated temperature in relation with tests that have proven and validated the idea that aquatic temperatures will be increasing by three degrees Celsius over the next fifty years.

Methods/Materials
To analyze the data and incorporate the extensive research, five goldfish fish were at first conditioned with a classical conditioning process. They each lived in a contol tank where the temperature remained the same 21 degrees Celsius over the course of the test. They were then conditioned in the test tank without mazes to retrieve their food stimulus at the opposite end. After a week#s time, the fish were then placed through the testing mazes for three trials, with the temperatures increasing by three degrees Celsius, up to 30 degrees. Over the course of two weeks, the fish were tested in the mazes at the varying temperatures.

Results
Consistently through the course of the test, the fish proved to perform better and complete the mazes when the temperatures were higher. Conversely, when the temperatures were near the control group of 21 degrees Celsius, the fish moved significantly slower. The fish proved to possess the ability to be conditioned to understanding the presence of a stimulus, and also benefit from increased temperatures in their environment. The increased temperature speeds up the activity of the fish and their instinctual ability for survival.

Conclusions/Discussion
Overall, the goldfish respond to the increased temperatures by increasing speed of movements and effectiveness in judgment. Each fish went through the mazes at greater speeds when the temperatures were higher because they have a sensitive physiology that makes them highly vulnerable to their surroundings. The gills are sensitive to the water, and any change in the environment upsets the homeostasis. Therefore, to create balance, the fish increase movement and action to offset the increased temperatures. This response to a stimulus therefore shows favorable characteristics to a point where they can withstand the greater temperatures.

Summary Statement
The test demonstrates the global effects of rising temperatures in bodies of water on the ability of goldfish to obtain food and survive.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Daniel Keeley; Kathryn Keeley

Project Number
S2407

Project Title
The Effect of Urbanization on a Woodland Bird Community

Abstract

Objectives/Goals
Our objective was to determine the effect of urbanization on woodland bird feeding behavior. Our focus was on two aspects of urbanization: the direct and indirect effects of humans. Indirect effects were pets and new and novel sounds, while direct effects were the presence of both humans walking and talking.

Methods/Materials
Our project took place at a homemade bird feeder positioned at the interface between the woodlands and an urban environment. We had three different experiments regarding our objective:
Indirect Effects:
1. Animal Presence: tested the effect of the presence of cats or dogs (both close and far from the feeder).
2. Domestic Sounds: tested the impact of the sounds of hard rock music and cars (both close and far from the feeder). Used a decibel meter.
Direct Effects:
3. Human Presence: tested the presence of humans walking (continuously and intermittently) and the sound of talking (close and far from the feeder).
To analyze our data better we used statistics (ANOVA test, Tukey test, and Linear Regression Analysis) with a program called "Systat 11".

Results
1. Dogs and cats have a statistically significant effect on bird feeding when they are close to the feeder. Both the number of birds and the diversity of birds decreased.
2. Sounds also had a significant effect on bird feeding. The car traffic sounds had no noteworthy effect, though, probably because its decibel level was equivalent to the sound cars generated from 30 m from a road. The much louder sound of hard rock music produced a very significant decline in number of birds and a tendency towards lower diversity of birds.
3. The sound of humans talking had relatively little effect on bird feeding, but when people were continuously walking within 5 m of the feeder, there was a significant decline in both the number and the diversity of birds that fed at the bird feeder. One bird species was not inhibited by human presence, however, indicating that some birds were more tolerant of people.

Conclusions/Discussion
These results lead to our suggestions of steps humans can take when they live in a woodland bird community to significantly decrease their impact on birds as well as greatly increasing the number and

Summary Statement
Our project investigates the impact urbanization may have on birds in a woodland community by studying the direct and indirect effects of humans.

Help Received
Father gave suggestions and proofread papers. Mother helped cut paper & backgrounds.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Stephen K. Lam

Project Number
S2408

Project Title
Effect of Toothpaste-derived Fluoridation on Sea Urchin Fertilization and Development

Abstract

Objectives/Goals
To test the potential effects of fluoride as derived from toothpaste on the fertilization and developmental process of sea urchins.

Methods/Materials
Forced the release of gametes by injecting sea urchins with potassium chloride. Eggs and sperm acquired from this were mixed in solutions of seawater containing different dilutions of toothpaste. The success with which the eggs were fertilized was re recorded. Embryos were then allowed to develop overnight to observe the effects that the different concentrations of toothpaste-derived fluoride had on the developmental process of sea urchin embryos.

Another trial was done to test the effects of a fluoridated environment on healthy and developing sea urchin embryos. This was done by isolating embryos into separate wells on a tissue sampling tray.

Results
Toothpaste demonstrated an obvious and detrimental effect on the fertilization and development of sea urchins. Embryos fertilized and developed within toothpaste solutions were either killed or unable to continue developing normally.

Conclusions/Discussion
Although the results of this project do not directly prove that fluoride causes the abnormal development of sea urchin embryos, toothpaste can. In all four trials conducted during this experiment, most samples subjected to unnatural concentrations of fluoride showed abnormal development.

Summary Statement
This study tested the effects that toothpaste-derived fluoride has on the fertilization and development of sea urchins.

Help Received
Biology teacher (Dr. Jay Vavra) supervised experimentation; Dr. Vavra also dived for the sea urchins used in this experiment.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Nadine I. Levin

Project Number
S2409

Project Title
The Bug Bully

Abstract

Objectives/Goals
For my experiment, I wanted see if animals have a way of thinking or emotions. I believe that insects have a bit of the same mindset that more advanced and modern animals do, feeling pain and having a sense of self, but not to the degree of complexity that we have as humans. My experiment is to test the reaction of a cockroach when confronted with fear of a human hand waving in front of it. I will test the relationship between fear and the heart, since stress is directly correlated with the heart rate, or at least in humans.

Methods/Materials
To measure the heartbeat, I have to build a machine that relies on tiny magnets to pick up the movement of the heart or the heartbeat. The machine will sense the magnet#s movement when the insect#s heart beats, the variation in the magnetic field will be read by the machine, and on a monitor you will be able to see the heart beat. Not only will I need two micromagnets, I will also need pliers, a helping hands tool, a stiff plastic arm, a Hall Effect Transducer, a petri dish, a metal project box, a shielded three-core cable, many different types of adapters, transmitters, wiring and a couple of ordinary household nine-volt batteries. For insects, I will use cockroaches.

Results
The two cockroaches that I collected data from both showed similar results during the trials, with hand waving heart rate significantly lower than the trials without hand waving. The male tested to have an average of 25 beats per minute without hand waving and 7.6 beats per minute with hand waving.The female tested to have an average of 23.2 beats per minute without hand waving and 6.8 beats per minute with hand waving.

Conclusions/Discussion
According to my information, cockroaches obviously do fear humans as they make sudden movements about the cockroaches as if they are about to kill them. The difference in heartbeat between hand waving and non-hand waving trials shows that even the smallest of animals feel even the simplest emotions, in this case fear. Animals throughout the ages have been regarded as just beasts, but even the measly cockroach has emotions. This data actually was what I expected but maybe not the same extent. Even though I love animals, the fact that a cockroach, one of my least favorite animals, feels emotions was surprising.

Summary Statement
My project is about the relationship between animal thoughts and their physical signs of intelligence or in my project, through their heartbeat.

Help Received
Dad helped my with my circuit board and Used lab equipment under the supervision of lab tech

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Evan J. Lincoln

Project Number
S2410

Project Title
The Effect of LED Wavelength on the Phototaxis of Artemia

Abstract

Methods/Materials
First, I made a testing light box out of a plastic lid by making a hole in the flat top of it. Then, I took a sheet of graph paper and punched a hole the size of an LED in the center of it. I took a petri dish filled with the Artemia that were being grown in an aerated tank. I then placed the LED up through the bottom of the box to the hole, and held it there with the clay. Next, I turned off the lights and dispersed the Artemia around the dish randomly. I took a picture of the dish and turned on the LED. I waited five minutes and then took another picture. I repeated this test three times for each color LED, and tested four LED#s per day. I then counted the amount of Artemia in each ring of squares in each picture. After compiling these results into a table, I ran the Fisher#s Exact Test on each colored LED against the control LED, red, to determine the significance of my results, and to confirm that the behavior observed was not random. The following are my results.

Results
The results of this study have shown low to no sensitivity to longer wavelengths. This is shown by the Artemia in tests with longer wavelengths of 630 nm (Red), where the Artemia do not change from their random distribution when exposed to the light. The study also showed that there is an increasing sensitivity as the wavelength of the light decreases, where when the Artemia were exposed to 528 nm (Green), 471 nm(Blue), and 400nm (UV) light sources, they changed from a random distribution around the light source to a distribution highly concentrated around the light source. The data also showed that as the Artemia mature, they become even less sensitive to longer wavelengths and become more sensitive to shorter wavelengths. More specifically, the Artemia show no sensitivity to 528 nm (Green) light in the latter half of their life cycle.

Conclusions/Discussion
In conclusion, I found that the Artemia are sensitive to shorter wavelengths such as those found in blue and UV light, but become less sensitive as the wavelength increases. They also become less sensitive to green light as they mature. This could point to a behavior such as a shift in the water column as they mature, and I would like to pursue this idea in a future project. If anything, I would like to find a more precise way to measure the phototaxis and distribution of the Artemia. All in all, I look forward to finding out more about this fascinating topic.

Summary Statement
This project is about the effect of the wavelength of light emited from a Light Emiting Diode on the phototaxis, or movement in regards to a light source, of brine shrimp of the species Artemia.

Help Received
Used lab at UCSB under the supervision of David Plachetzki

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Allison Q. Nguyen

Project Number
S2411

Project Title
Sugars' Effects on Ants

Abstract

Objectives/Goals
This experiment tests the effects of different sugars on the energy and hyperactivity level of the Pogonomyrmex californicus, or the harvester ant. The concept of a sugar high and sugar low are tested. The effects of artificial sugars are monitored as well.

Methods/Materials
To investigate the problem, I fed the different solutions to different ants and observed their movements and speed. For each group of ants, I altered the ingredients in the solution that I fed to them. The sample size in which these ants could provide is infinite. They can move at any speed in which they can. In order to acquire the proper data, I had to complete two-hundred trials meaning the testing of two-hundred ants in total. I tested in groups of ten: ten ants per group, 4 tests for each. When I measured the speeds of the ants, I wrote them down in seconds down to the millisecond, but when it was necessary, I included the minutes.

Results
The control's standard deviation was 1.054, the cane sugar group's was 2.736090687, the Equal group's was 4.241, the honey group's was 6.80, and the Splenda group's was 7.043. According to the data, the Splenda group was most affected by the sugars, and the cane sugar group was the least affected.

Conclusions/Discussion
The Splenda group had the largest spread of data because of its mix of different sugars, such as maltodextrin and sucrose. The cane sugar group had the least spread of data because it is the most pure of the sugars, it only ingredient being sucrose. Honey was the second least affected because it mostly contained fructose and glucose. Equal was the second to most affected due to its main ingredient of aspartame which affects the brain directly as a side effect.

Summary Statement
This project is about testing the concepts of hyperactivity linked with different sugars, artificial and natural.

Help Received
No one helped me.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Trenton J. Otto

Project Number
S2412

Project Title
Mazed and Confused

Abstract

Objectives/Goals
This project determines, with the supplementation of numerical data, ants# capacity to acquire new knowledge by attempting to train them to memorize the layout of a miniature maze.

Methods/Materials
With the maze layout remaining constant (independent variable), two groups of 15 Harvester ants each underwent 15 consecutive #maze-runs,# and their completion times for each one were recorded (dependent variable). Sugar was placed in the same exact corner for each trial, the #finish# corner, and the ants were dropped into the same corner for each maze run as well.

Results
Despite ants# incredible versatility, as well as numerous trial runs, I hypothesized that the ants wouldn#t be able to memorize the maze#s layout and thus run progressively faster completion times. My experimental results supported my hypothesis, because there was no discernable pattern of change in completion times over the course of the 15 trials.

Conclusions/Discussion
Mazed and Confused provides insights into the mental capacity and behavioral patterns of the harvester ant, one of California#s most costly agricultural pests. With a more extensive and definite understanding of the little menaces, we can better develop more effective and more eco-friendly methods of controlling them, which will maximize food production and limit the necessity to use environmentally damaging pesticides in agriculture.

Summary Statement
This project provides insight into ants' mental capacities by training a group of them to memorize the layout of a maze.

Help Received
Mother helped gather materials.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Brittany N. Smith

Project Number
S2413

Project Title
Regeneration in Earthworms

Abstract

Objectives/Goals
The objective of regeneration in earthworms is to find out whether specific severed segments will affect the different regenerative processes in either half of the worm, and halves are considered as part A(anterior end), and part B(posterior end).As well as, to consider the points where an earthworm will re-grow if severed at particular areas.

Methods/Materials
During my experiment, I tested 60 worms or specimens and with each new worm one segment was cut (ex. Specimen 1: segment 1 was severed, specimen 8 the eighth segment was severed, etc.) Also, materials used included European Earthworms, an exacto- knife, igniter, plastic bags, water, and bedding. Each worm was recorded by specific characteristics, and the worms would be cut at particular segments (segments 1-60). Furthermore because both halves of the worm would be observed for the same time period data was taken during the worm's health condition and whether any improvements in regeneration would occur.

Results
Lastly, I had found that the worms that were severed at the segments ranging from 40-60 survived for a significant longer period of time, whilst showing signs of the two key factors of regeneration; a blastema and segment budding. On the other hand beginning segments such as 1-10 part A. of the worm would soon die while the remaining part B would survive.

Conclusions/Discussion
Regeneration in earthworms is a two part discernible process where the data had shown the overall part B (posterior ends) would ultimately live for a longer period of time in comparison to part A (anterior ends). Also, not only is regeneration an important cellular function of mitosis, not meiosis, earthworms are hermaphrodites and thus basic tissue cultures relate to mitosis. In addition to the data shown, my hypothesis of, #If I cut an earthworm at or above the clitellum both halves will die#, was wrong in the sense that both ends would survive, but not for the allotted time frame.

Summary Statement
My project consults whether or not earthworms will regenerate if cut at specific segments.

Help Received
My mother helped take pictures, give transportation, and preview my report.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Stephan H. Spangenberg

Project Number
S2414

Project Title
How Does Nutrition Affect Honeybee Longevity?

Abstract

Objectives/Goals
This project was designed to assist in the national search for the cause of Colony Collapse Disorder, which is destroying domestic honeybee colonies. I sought to identify or eliminate honeybee nutrition as a factor contributing to this disorder, by testing if the pollen bees have access to under normal domestic conditions contains the nutrients necessary to face infection, in comparison to a blend of specially prepared, well balanced pollen. In addition, I tested the effects of a high-fat diet on bees, in an attempt to identify an improved method of nourishing, and therefore protecting, bees.

Methods/Materials
Bees were isolated in six contained groups. Groups were fed either local pollen, ideal pollen or ideal pollen with added canola oil (fat). For each of these three types, there was also a group fed blended bees, exposing them to diseases they face under normal conditions. Diets were evaluated based on the average lifespan of the bees that consumed them. The experiment was run twice.

Results
The groups of bees fed local pollen and blended bees had average life spans of 3.39 and 4.09 days whereas the groups fed ideal pollen and blended bees had average life spans of 4.66 and 5.63 days. The life spans of the high-fat diet groups fed blended bees were 5.43 and 5.30 days.

Conclusions/Discussion
From these results I conclude that local pollen lacks essential nutrients, thereby weakening the bees# immune systems. The results from the groups fed canola oil indicate additional testing would be required before conclusions could be reached.

Summary Statement
This project investigated honeybee nutrition as a possible factor in Colony Collapse Disorder, a phenomenon destroying domestic honeybee colonies.

Help Received
Dr. Eric Mussen answered some of my questions, professional beekeepers helped safely handle bees.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Ariel Takayanagi

Project Number
S2415

Project Title
Ants as Habitat Quality Indicators for the Glaucopsyche lygdamus palosverdesensis, the Endangered PV Blue Butterfly

Abstract

Objectives/Goals
The objective was to determine whether the presence of native ants indicate a potentially healthier habitat for the endangered Palos Verdes blue butterfly, Glaucopsyche lygdamus palosverdesensis, than an area with mostly invasive ants.

Methods/Materials
Five preserves including the Defense Fuel Supply Depot, Chandler, Three Sisters, Alta Vicente, George F. Preserves of the Palos Verdes Land Conservancy were surveyed for native and invasive ants using a pooter. The ants were stored in vials of alcohol and identified using a microscope and an ant key.

Results
While six species, including one invasive exotic, Linepithema humile, and five native species, Pogonomyrmex californicus. Messor andrei, Solenopsis xyloni, Prenolepis imparis and Camponotus semitestaceus, were found at DFSP; only L. humile was found at Chandler, Three Sisters, Alta Vicente, and George F. Preserves.

Conclusions/Discussion
The fact that only the invasive exotic species of the Argentine ant were found at four of the sites indicates that there is a lot of work to be done before they reach the level of health of the undisturbed DFSP habitat. This could involve gradual reduction of irrigation because extra water attracts the Argentine ant, lowering the chances of native ant survival (Snelling 2007). It can be concluded that once areas of natural habitat on the peninsula are irrigated and planted over with non-native plants, it is extremely difficult to bring the habitat back to its normal state.
Although the native ants were not found at Chandler or George F., the plantings of the butterfly host plant will continue. Whether the new habitats in areas that have been overrun by L. humile are successful for the reintroduction of the butterfly in the long run will reveal if the presence of the native ant species is required for the survival of the Palos Verdes Blue butterfly. Further study should be done to determine which ant species can be good partners to help the Palos Verdes Blue butterfly survive.

Summary Statement
Areas of the Palos Verdes Peninsula Land Conservancy were surveyed for native and invasive ants to determine whether the areas were healthy habitats for the reintroduction and reestablishment of the endangered Palos Verdes blue butterfly.

Help Received
Ann Dalkey from the Palos Verdes Peninsula Land Conservancy provided areas a lab and areas for surveying. Dr. Roy R. Snelling, Curator Emeritus of the Natural History Museum of Los Angeles trained the researcher how to poot and identify ants.

CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

Bonnie R. Lei

Project Number

S2499

Project Title

Cryptic Species and Synonyms: A Reclassification of the Tropical Spurilla Genus

Abstract

Objectives/Goals

Populations of Spurilla neapolitana and S. sargassicola in the tropical Eastern Pacific and Western Atlantic are assessed through genetic and morphological analyses of specimens to determine whether any cryptic species of S. neapolitana exist and conclude whether S. sargassicola is a synonym of S. neapolitana.

Methods/Materials

S. neapolitana specimens from 5 Pacific locations and 2 Atlantic ones were compared with S. sargassicola specimens. Partial 16S rRNA and H3 histone coding genes were extracted from non-cerata tissue using Chelex, then amplified in PCR. Cleaned and diluted PCR products were sequenced then analyzed using computer programs Geneious, CLC Free Workbench, and MacClade. Diagnostically reliable features including the radulae, jaws, reproductive organs, and external morphology were compared through the use of SEM micrographs and camera lucida.

Results

Maximum likelihood trees (1000 bootstrap replicates) constructed from 16S and H3 sequences both demonstrate that the Stocking Island, Bahamas population of S. neapolitana is an exclusive clade. 16S tree shows that S. sargassicola groups with all other S. neapolitana specimens. Morphological data corroborates these findings. The Bahamas S. neapolitana population has significantly (P=0.01) longer and slimmer lateral denticles and central cusps in the radula than all other specimens. The convoluted bursa copulatrix structure of the reproductive system was also identical for all Atlantic specimens, except Bahamas S. neapolitana. The jaws and external morphology are proven to be inefficacious as differentiating characteristics.

Conclusions/Discussion

With the presented data it is certain that S. sargassicola is a synonym of S. neapolitana and should not retain its separate species name. Also, the Bahamas population of S. neapolitana is identified as a highly likely cryptic species which will be verified once fresh specimens of other Spurilla species are obtained to serve as accurate outgroups. These results provide crucial insight into the understanding of biodiversity in this genus and thus are key to future conservation efforts.

Summary Statement

Genetic and morphological analyses are utilized to determine whether any cryptic species of circumtropical aeolid Spurilla neapolitana exist and conclude whether similar species S. sargassicola is a synonym of S. neapolitana.

Help Received

Used lab equipment at California State Polytechnic University, Pomona under the mentorship of Dr. Angel Valdes.