CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Kristen M. Allard

Project Number
J1901

Project Title
The Effects of Osmosis on Decalcified Eggs

Abstract

Objectives/Goals
My objective was to determine if osmosis would cause decalcified eggs to shrink in corn syrup and expand in water.

Methods/Materials
Six raw eggs were decalcified in vinegar. Three were placed in separate containers of corn syrup and three in separate containers of water. A tape measure was used to measure the length, width and circumference of the eggs before they were placed in vinegar, after they were removed from the vinegar, and daily for three days while in corn syrup or water. The eggs were also observed for visible changes. A comparison was made between the size of the eggs before the experiment to their size at the end of the experiment.

Results
The circumference of the three corn syrup eggs decreased by an average of 4 cm, their length decreased by an average of .77 cm, and their width increased by an average of .3 cm. The circumference of the three water eggs increased by an average of 2.03 cm, their width increased by an average of .73 cm, and their length increased by an average of .77 cm.

Conclusions/Discussion
My conclusion is that osmosis causes great changes in decalcified eggs. Osmosis equalizes the concentration of water on both sides of the egg membrane. Since a container of corn syrup has a lower concentration of water than an egg, the water molecules moved out of the egg to try to balance the number of molecules on each side of the membrane, causing the eggs to shrink. The water eggs expanded due to the greater concentration of water outside of the membrane. The process of osmosis is necessary for all cells to survive.

Summary Statement
My project explored how osmosis affects the size of three decalcified eggs placed in corn syrup and three placed in water.

Help Received
Mother proofread and edited report. Sister helped set up graphs on computer.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Marissa K. Bergmann

Project Number
J1902

Project Title
Ladybugs and the Amazing Technicolor Test Tube

Abstract

Objectives/Goals
This experiment tested ladybugs for preference of color and light.

Methods/Materials
There were four experiments. One tested for red, yellow, or blue preference. The others tested between blue and dark, blue and light, and light and dark. The experiment tubes were covered with either colored cellophane or construction paper. Six ladybugs were placed in each tube for ten minutes. At the end of the ten-minute period, results were recorded and the ladybugs were transferred to the next experiment tube. A total of 180 ladybugs were tested.

Results
The results showed no preference between the colors red and blue, nor between blue and dark. There was a slight difference between light and dark, but the difference was not significant enough to establish a preference. There was only one test where ladybugs were found twice as much in blue than in light.

Conclusions/Discussion
What can be concluded is that ladybugs do not show a consistent preference for colors. This proves the hypothesis incorrect. The original prediction was that the ladybugs would prefer the color blue because the research stated that they are colorblind to red and yellow.

Summary Statement
This experiment tested ladybugs for preference of color and light.

Help Received
Mother helped in handling ladybugs and with display board.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Kasmian Campa

Project Number
J1903

Project Title
Attack of the Stingers

Abstract

Objectives/Goals
The objective of this experiment was to find out which bait lured the largest quantity of yellow jackets; also which trap captured the hisghest amount of yellow jackets.

Methods/Materials
Their were 11 different baits tested to lure the yellow jackets and 4 different traps used to capture yellow jackets. 11 styrofoam cups were used to hold the baits with steel meshes to cover them. I recorded the data in time phases of 5, 10, 15, 20, 30, 45, 60, and 75 minute periods. For the traps, I used the 4 traps and placed them over different garbage cans. I tested these in a 1hr. time phase.

Results
The data results of this experiment show that in the baits experimenting, that the raw fish lured the most yellow jackets; it lured a total of 244 yellow jackets. The Sterling Rescue Disposable Trap captured a total of 235 yellow jackets in 1hour.

Conclusions/Discussion
The conclusion of this experiment is that the hypothesis for the baits was incorrect; the hypothesis was that the lemonade would work best. But it turned out that the raw fish was the best. The hypothesis for the traps was correct; the hypothesis was that the Sterling Rescue Disposable trap would work the best. The information attained from the experiment helps people in selecting the best bait and trap.

Summary Statement
This project is about finding which bait and trap will capture the most yellow jackets.

Help Received
My father took me to the place of testing and helped set-up baits and traps; my mother would buy my accessories and materials needed for experiment. Both proofread all my papers and made sure they were perfect.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Cameron B. Clegg

Project Number
J1904

Project Title
What Ticks Want: An Evaluation of Ticks in Arroyo Verde Park

Abstract

Objectives/Goals
The goal of my project was to determine if ticks capable of carrying Lyme's disease live in Arroyo Verde Park. I was also interested in investigating what ticks are attracted to.

Methods/Materials
I collected ticks on different occasions at the park by dragging a flannel cloth along the bushes that line the running trail. After identifying what kinds of ticks I found, I put them into the testing apparatus to determine what they were attracted to. I designed the testing apparatus, which was a petri plate with three holes in the top, and test tubes over the holes. In each test tube I put a small sample of the "attractant". Over the course of my experiments, I tested human sweat, dog hair, light, as well as dog hair from a Frontline treated animal. Of course, in each test, one of the tubes had nothing in it to serve as my negative control.

Results
I captured three different types of ticks. I identified eleven American Dog ticks, six Western Black-legged ticks and one Pacific Coast tick. The Western Black-legged tick (ixodes pacificus) is a known carrier of the Lyme's disease-causing bacteria. Although I don't know if these specific ticks were infected, it is possible that they were carriers. After running 24 independent experiments, I found that all of the different types of ticks were most attracted to the dog hair. Interestingly, after we treated our dogs with Frontline, their hair was no longer attractive to the ticks!

Conclusions/Discussion
1. I found three types in Arroyo Verde Park, including the known carrier of Lyme's disease, ixodes pacificus.
2. All of the different types of ticks were most attracted to dog hair until we treated our pets with Frontline.

In conclusion, my hypothesis was correct. There were ticks capable of spreading Lyme's disease in Arroyo Verde Park and they were attracted to dog hair.

Summary Statement
I wanted to find out if ticks that can carry Lyme's disease bacteria live in our local park, and also what they are attracted to.

Help Received
My Dad and Mom got supplies for me, taught me how to use the graphing program and helped me collect ticks.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Breanna R. Collier

Project Number
J1905

Project Title
Earthworm Survival in Simulated Microgravity: A Space Study for Enhancement of Crop Production and Waste Recycling

Abstract

Objectives/Goals
My goal is to determine if earthworms can survive and then reproduce in a simulated microgravity environment. And if so, then earthworms could be used by a space station to enhance crop production and recycle garbage and sewer sludge.

Methods/Materials
A clinostat was constructed using a gas barbecue rotisserie, bucket and wooden box. This is used to simulate microgravity by slowly rotating and changing the direction of gravity on the test cups. For each trial, 32 native earthworms were placed in 8 cups (4 worms/cup) containing organic potting soil. In trial A, 4 cups were rotated at 1 rpm in the clinostat for 7-days and 4 cups were placed on a shelf nearby as controls. This was repeated for 30-days in trial B except controls were placed on the same shelf as the clinostat. Every 2 days the earthworms were feed, counted, and cups checked for egg capsules or hatchlings.

Results
In the 7-day trial 81% of the control earthworms survived and 0% of the earthworms rotating in the clinostat survived. In the 30-day trial, 37.5% of the control earthworms survived and 25% of the earthworms in simulated microgravity survived. In the 30-day trial most deaths occurred within the first 4 days, then the survivors continued to live for the remaining weeks. No egg capsules or hatchlings were found. No reproduction was observed.

Conclusions/Discussion
Earthworms will survive in a microgravity simulation but may or may not reproduce. I noticed that many of the test earthworms died the first few days but none died in the following weeks. The survivors may have a physical attribute or genetic trait, which better adapts them to simulated microgravity like you would find in a space station. Earthworms add nutrients to the soil and can increase crop production. Earthworms are also able to recycle garbage and sewage sludge. They could help to create a self-sustaining space station ecosystem.

Summary Statement
Earthworms placed in a clinostat to simulate microgravity have shown a 25% survival rate after 30 days and have potential for space crop enhancement and waste recycling.

Help Received
Mother and teacher reviewed project and edited writing. Grandfather helped with drilling on clinostat.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Joseph S. Dickerson

Project Number
J1906

Project Title
Snail Trails: The Effect of Environment on the Color of a Snail's Shell

Abstract

Objectives/Goals
My objective is to determine what effect environmental factors such as soil composition have on the development of snail shells. For example, does the high limestone content of the soil in a park below a large cement plant cause the unusual white shells of snails that thrive in that park?

Methods/Materials
I obtained consent to collect snails, soil, and living plants from an open space preserve in the local foothills. This park has white-shelled snails that look identical to common brown garden snails. I also collected samples from my yard. I created four closed environments, and placed white and brown snails in native and non-native enclosures. I then conducted tests for pH content (soil acidity), shell strength, and color changes -- particularly in the baby snails I collected.

Results
No color changes were observed during the project. The soil from the open space preserve was approximately 5.5 on the pH scale, compared to 4.0 for my yard, a good indication of higher limestone CaCO(3) content. Drops of hydrochloric acid confirmed the presence of limestone in the white shells. The white shells were more than 9 times stronger than the brown shells.

Conclusions/Discussion
Near the end of my project, I learned from an expert I had previously contacted that the snails were different species, with genetics dictating their colors. It's interesting that I have only seen white snails in this limestone-rich environment, while brown snails are so common, and I wonder if environmental adaptations could cause some color changes over time.

Summary Statement
My project was to discover whether the mineral content of the soil in a specific area can influence the color, strength, or other characteristics of a snail's shell.

Help Received
Dianne Connelly, science teacher; Dr. Shannon Brose and Dr. Veta Kenk, San Jose State University Biology Department; Neil Fahy, California Academy of Sciences; Kathleen Hart, Open Space Preserve Permit Office; Hansen Corporation (Quarry); Francis and Lynne Dickerson.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Vincenzo A. Ellis

Project Number
J1907

Project Title
Comparative Habitat Use by Shorebirds

Abstract

Objectives/Goals
I looked for any differences in population density and species diversity of shorebirds in the three areas that I observed.

Methods/Materials
Three of the most common shorebird habitats are found in San Diego. These include mudflat, sandy beach, and rocky shore. I observed, identified, and recorded shorebirds at the San Diego River Channel (mudflat), the beach north of Scripps Pier (sandy beach) and the rocky intertidal area also north of Scripps Pier. I looked for any differences in population density and species diversity of shorebirds in these areas. I used a Shannon-Weiner Species Diversity Index and an ANOVA test of density to assess my results.

Results
The river channel has the highest density out of the three areas measured. The Shannon-Weiner test indicated that the river channel was slightly more diverse than the rocky shore and that both were much more diverse than the beach area. Statistical tests showed that there was a 50% chance that the diversity in the three areas was due to randomness. The chance that the density in the three areas was due to randomness was one to 100.

Conclusions/Discussion
Learning about shorebirds is important because they are major predators and a very important part of coastal ecosystems. In addition, some of these shorebirds are endangered. Goss-Custard (1979) argued that knowing shorebird habitat use was important for their conservation, because development ought to occur in areas that will impact them the least. My research in this project will contribute to the knowledge of shorebirds. The place that ought not to be developed are the San Diego River Channel and the Rocky Intertidal north of Scripps Pier. This is because they had the river channel had the most amount of birds and the rocky intertidal had largely different birds yet with a high diversity.

Summary Statement
The purpose of this project is to investigate the use of coastal areas by shorebirds.

Help Received
I would like to thank my father, Dr. Hugh Ellis, an avian physiological ecologist for teaching me about Charadriiformes, giving me access to scientific articles, and for giving me a lot of advice along the way. He also drove me out to the three areas and taught me how to identify birds accurately. I would also like

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Crystal Espinosa; Veronica Orozco

Project Number
J1908

Project Title
Macroinvertebrates of Anderson and Robinson Creek

Abstract

Objectives/Goals
How does the population of macroinvertebrates differ in a seasonal stream vs. a year-round stream?

Methods/Materials
Materials
1) Meter stick; 2) Rubber boots; 3) Forceps; 4) Homemade net; 5) Log book; 6) Permanent marker; 7) Stop watch; 8) Bucket; 9) Flagging; 10) Net; 11) Field guides; 12) Thermometer.
Procedure
1. Find a good riffle or pool that is not being disturbed by construction or a road. 2. Place the thermometer in creek. 3. Place net in water and put rocks in the bottom pocket so no insects can escape from the bottom. 4. Start timer for 1 minute. 5. Stand in creek and kick substrate. 6. Turn over all the rocks and try to disturb 1 inch under the sand. 7. When time is up, take the rocks out of the net and carefully raise it up. 8. Place net in a bucket. 9. Take the average depth of where you started kicking, where the net was placed and in the middle of those two. Also, don't forget to read the thermometer and record the temperature in the logbook. 10. Place flagging in the sand or tree to indicate where you sampled. 11. Take sample to lab to identify and count.

Results
From our data we saw that there are a lot more Ephemeroptera insects than any other insect in both creeks. The second most found was Coleoptera followed by the Plecoptera and the Hemiptera which both had seven. We did not find any Odonata in any of the creeks. The total of Anderson Creek was 168 insects and the total of Robinson Creek was 152 insects. There were 9.5% more insects in Anderson Creek than in Robison creek.

Conclusions/Discussion
From doing this project, we concluded that there were more aquatic Macro-invertebrates in Anderson Creek, the year-round stream. Anderson Creek had 168 insects and Robinson Creek had 152. There were 9.5% more insects in Anderson Creek than in Robinson Creek. We could improve this project by making ten sites on each creek instead of five. The only problem we had is that sometimes the tails of the insects came off so they were harder to identify. We are planning to do another project that relates to this one so that we can learn more about the insects and the creeks.

Summary Statement
We collected, identified, counted and compared the populations of macroinvertebrates in two different stream enviornments.

Help Received
sister helped edit report; used the school computer lab; got net materials and keying help on identifying macroinvertebrates from Mr. Woods

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Andrew (Andy) J. Hiller

Project Number
J1909

Project Title
Super Sow Bugs

Abstract

Objectives/Goals
The objective of my experiment was to determine what amount of light sow bugs prefer when given the choice of a shaded terrarium or a non-shaded terrarium.

Methods/Materials
I wrapped two terrariums with black construction paper. Then I put soil in each terrarium, followed by fifteen sow bugs in each one. Immediately after I places a light with a 50 watt grow light over the terrariums. Then I placed weed cloth over one of the terrariums. My purpose was to create two different environments for comparasion.

Results
The sow bugs in terrarium A (shaded) were healthier and more active than the sow bugs in terrarium B. In terrarium B (unshaded) the sow bugs were not as healthy, less active, and one of them died. In conclusion, I observed that the sow bugs preferred less light. If they were exposed to too much light, they would become sickly and possibly die.

Conclusions/Discussion
My results did support my hypothesis, because my hypothesis was that I thought the sow bugs would prefer dark areas and my results confirmed that. Conducting this experiment greatly expanded my knowledge of zoology and isopods. Before, I didn't know of sow bugs light preferences and now I know everything from their eating habits to their preferred habitats.

Summary Statement
In this project I compared the light preferences of sow bugs; it was evident that they preferred less light.

Help Received
My mom, Suanne, helped type my report, my teacher, Mrs. Underwood conferenced with me, and my dad, Tom helped with setting up my graph.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Claudia Huizar

Project Number
J1910

Project Title
Fruit and Drosophila melanogaster

Abstract

Objectives/Goals

In my project I used fruit flies to see what fruits they preferred. I had five containers, one in the center of which five stretched out of, they were connected by pi-pets. In all four there was a different fruit. The fruits I used were bananas, apples, oranges and pears. First of all when I received my flies I put them to sleep with Fly Nap. After, I put all of them to sleep, I placed them in the center container. On the next morning I went to see if they had done a preference. They had. I had clear containers so I could see them. I counted how many were on each fruit every day. I kept all my data on a journal. I did this for thirty-five days. Since some days they go to different fruits, I had to average the amounts together. Every two weeks I had to change the fruits, when I did that I placed them in the middle container to see which fruit they would prefer.

My results were very interesting. Some fruits gained flies each day and some started decreasing. At the end I added all the numbers and divided them by the number of dates to have an exact number. Here are my averages, bananas had an average of thirty-seven, apples had an average of six, pears had an average of zero and oranges had an average of seven. It was interesting because at the beginning my results were very different.

Methods/Materials

1)Fruit Flies(to do my project); 2)Fruit (Bananas, Apples, Oranges and Pears to put in containers); 3)Five Containers(to place fruit and fruit flies in); 4)Four pi-pets(to connect containers); 5)Fly Nap(to sleep flies); 6)Gloves(to handle decaying fruit); 7)Sponges(on top of container so that the fruit flies can breath).

Results

My results were very interesting. I found out by my results that fruit flies prefer bananas better than apples, oranges and pears. The fruit that was disliked was the pear, none of the fruit flies went to it. My averages through out the whole time were bananas 37, apples 6, oranges 7 and pears 0.

Conclusions/Discussion

My hypothesis was wrong. My flies preferred to eat the fruit that rotted faster. They preferred the banana. I believe they preferred the banana because it had a very sweet smell. I believe the flies preferred it also because it didn#t become as juicy as the other fruits.

Summary Statement

Seeing which fruit Drosophila melanogaster prefer.

Help Received

My teacher Mr. Susman for helping me when I had trouble.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Kristen D. Kelley

Project Number
J1911

Project Title
What Natural Substances Repel Ants Best in an Outside Environment?

Abstract

Objectives/Goals
The purpose of this project is to determine what natural substances will repel ants the best in an outside environment. This project was chosen due to the fact that ants are bothersome to many people. Also, many people want to use non-chemical methods to repel ants.

Methods/Materials
To perform this experiment, several substances were selected which research indicated might have some ability to repel ants. Portions of ant bait were covered with these substances at several different locations in the area of Encinitas, California. The substances were then checked for ant activity numerous times over a two-day period. The number of ants on each bait was recorded at each of these check points. The substances tested were ground cinnamon, ground cloves, fresh chopped basil, chopped orange peel and ground red pepper. Ricola Natural Herb Cough Drops were used as the ant bait since they are known to attach ants from common experience.

Results
The results of this experiment show that ground cinnamon and ground cloves both repel ants effectively. Basil and orange peel had little to no ant repellent ability. The effectiveness of the various substances was also affected over time as some of them dried up and some were affected by the environment (for example: water sprinklers and dew).

Conclusions/Discussion
The various substances each repelled or attracted ants differently. The results from this experiment suggest that sprinkling cinnamon or ground cloves where ants are entering a home should help control them.

Summary Statement
This project was about the repellent ability of different natural substances on ants.

Help Received
Parents helped buy test bait and substances and drove me to test site. Science teachers advised what items needed to be in report and on board. Friend of father scanned in pictures.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Linda J. Lang

Project Number
J1912

Project Title
The Contents of Barn Owl Pellets in Urban Compared to Rural Areas

Abstract

Objectives/Goals
My goal was to make a very interesting and neatly done report.

Methods/Materials
The materials that were used are:rubber gloves, painter's mask, field data, books on identifying rodent skulls and insects, magnify glass, microscope, trays, glass case, insect pins, plastic bags, paper, pen, pencil, porcelain pans, forceps, toothbrush, bottle of bleach, beakers-500ml and paper towels.

Results
My results are that I found a more of a variety of rodents in rural areas and a less of a different variety in urban areas.

Conclusions/Discussion
My results did agree with my hypothesis, because I asked if there was a change 9in rodent species in urban and rural areas, and the answer to that is yes.

Summary Statement
My project is about the contents of barn owl pellets compared to different areas.

Help Received
My father helped my to determine the species name of the rodents, that I found.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Ryan A. Lind

Project Number
J1913

Project Title
Color Perception in Frogs

Abstract

Objectives/Goals
The goal was to see if frogs see colors and, if they do, which colors do they associate with safety.

Methods/Materials
A. Each frog is tested by putting it into the large chamber of the test box in a position where the frog has a view of both smaller chambers.
B. Set up the test box with the first color combination (Blue and Black).
C. If necessary, wiggle your finger behind the frog until he jumps into one of the smaller chambers, thereby indicating his color choice.
D. Record ten trials for each frog, reversing the colors after 5 trials. This is done to differentiate between the frog#s choice for color preference versus side preference.
E. Repeat for each color combination: Blue and Black, Blue and Green, Blue and Red, Black and Green, Red and Black, and Red and Green.
Materials:Cardboard box, Foam board, Colored paper, Black Spray Paint, Bucket, Net, Frogs

Results
When presented with two color choices, the test frogs went approximately 50 percent of the time to each color. Although the test frogs seem to not have a color preference, they did seem to display a strong preference for side.

Conclusions/Discussion
This apparent lack of color preference might be explained in a couple of different ways. First, frogs may simply not use color to determine a possible escape route. Second, although frogs are amphibians, they spend most of their time in the water and this could mean that their eyesight is not as adapted to land use. Maybe my frogs were having trouble seeing out of water. More testing would be needed to determine which of these possible reasons was the one responsible for my frog#s apparent lack of color preference. Or, possibly an entirely different reason would be discovered.
Although the test frogs seem to not have a color preference, they did seem to display a strong preference for side. At first, my test frogs would go into each of the smaller test chambers about half of the time. Later, when the frogs were tired, they began to only go into one chamber, either the left or right.
It appears that frogs have a dominant leg, just as humans have a dominant hand. I think that the dominant leg of the frog pushes harder then the other leg when the frog is tired, which might turn them consistently in one direction over the other. A left-legged frog would turn to the right and visa versa.

Summary Statement
By running frogs through a box maze, I tried to determined what colors frogs associate with safety.

Help Received
My parents helped type the report. and they drove me to locations to find frogs.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Donovan M. Melero

Project Number
J1914

Project Title
Phyto Females: Exceptional Egg-Layers

Abstract

Objectives/Goals
The reproductive potential of Phytoseilus persimilus, a predatory mite which feeds on spider mites, pests, is a key component in IPM (Integrated Pest Management) strategy. My objective was to determine the average number of eggs laid by Phyto females in a two day period. I thought that they would lay an average of 2.0 eggs a day.

Methods/Materials
I placed 21 kidney bean leaves with only spider mites and their eggs in 21 munger cells. I then placed a pregnant Phyto in each. I counted the number of eggs laid every 24 hours over a two day period by observing the cells under a microscope.

Results
I discovered that fat Phyto females laid an average of 3.7 eggs a day; fat, dark females laid an average of 2.0 eggs a day; flat, dark females laid an average of 0.5 eggs a day; and thin, dark females laid an average of 0.25 eggs a day. One thin, light female laid an average of 2.5 eggs a day.

Conclusions/Discussion
I concluded that my hypothesis was partially correct. The Phyto could lay an average of 2.0 eggs a day, but they could also lay a lot more. I also concluded that fat, light females laid more eggs than thin, flat, dark females. Overall, the condition of the female, temperature and the amount of available food were important to the reproductive rate.

Summary Statement
The goal of my project was to determine the average number of eggs laid by female Phytoseilus persimilus in order to increase the effectiveness of biological control.

Help Received
Used lab equipment at Syngenta Bioline under the supervision of Bobby Orr, who also supplied me with all materials necessary for my project.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Arlee L. Mesler

Project Number
J1915

Project Title
Are Bumblebees Local Shoppers?

Abstract

Objectives/Goals
The purpose of my project was to learn more about how bumblebees forage for nectar and pollen. Specifically, I tested the hypothesis that worker bees return to local patches of flowers as they forage throughout the day instead of looking for food at many different patches. I expected workers to forage in this way because it would save them time. The more efficient the workers are when foraging, the more new queens and males the colony will produce at the end of the season.

Methods/Materials
I marked bumblebee workers at five different patches of a mint called Stachys ajugoides. The distance between pairs of patches ranged from about 9 meters to 100 meters apart. At each patch, I used a different color of Testor model airplane paint to mark the bees. For example, at patch one I marked all the bees I could catch dark blue, and at patch three I marked them all green. I referred to the paint color used at a particular patch as the #home color# for the patch. After marking the bees, I returned to the patches 17 times over a period of three days and recorded the color of any bees I saw at each patch. If the bees I marked where resighted where they were originally seen, then my hypothesis would be true.

Results
The pattern was very strong. When results for all five patches are combined, 92 percent of a total 98 resighted marked bees had the home color. Values for individual patches ranged from 100 percent to 77 percent.

Conclusions/Discussion
It appears that bumblebees discover rewarding patches of Stachys ajugoides flowers and then continue to visit them for a period of time. They do not seem to search out new patches each time they go out to forage

Summary Statement
My project was about the foraging behavior of bumblebees.

Help Received
My dad suppiled me with my equipment. He also helped me with the actual project.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Genevieve G. Mount

Project Number
J1916

Project Title
Choosing a Vacation Home for Your Aphid

Abstract

Objectives/Goals
My goal was to test whether aphids, would live on their commercially grown summer host plants, if those hosts were planted in the winter.

Methods/Materials
Replications of 6 commercially grown summer hosts were randomly planted outside. Every week the amount of aphids was counted (not estimated) and recorded. Winter hosts were also checked to make sure there were aphids present.

Results
Aphids were found on all of the commercially grown summer hosts. There were more aphids on some hosts than others.

Conclusions/Discussion
Aphids will live on commercially grown summer hosts in the winter if those summer hosts are available. some crops had more aphids than others. There were 2 crops in particular that hosted the most aphids. Aphids seem to prefer some hosts more than others. This would be an area for further study. This shows that aphids will go to summer hosts durring the winter.

Summary Statement
Testing whether aphids are attracted to their commercially grown summer hosts if the summer hosts are available during the winter.

Help Received
My Dad helped plant plants and helped to glue the papers on my display board.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Roni P. Schmidt

Project Number
J1917

Project Title
Sea Urchin Roe as a Function of Depth

Abstract

Objectives/Goals
To find out if the depth at which a sea urchin lies effects how much roe it produces.

Methods/Materials
Materials 10 sea urchins from 10, 20, and 30 feet, KCL, seringes, sea water, and beakers.

Results
The deeper that a sea urchin lies the less roe it produces.

Conclusions/Discussion
The deeper the sea urchins were the less roe they produced

Summary Statement
Finding out at wich depth a sea urchin produces the most roe.

Help Received
I was helped by my teacher Mrs. Garza in setting up me display board.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Brian E. Schneider

Project Number
J1918

Project Title
Stink Bugs! Do Scents Affect Cricket Behavior?

Abstract

Objectives/Goals
The object of my experiment is to see if different scents affect cricket behavior.

Methods/Materials
One 12.5 x 7 inch clear plastic cricket cage
5 sheets of paper marked out in 2cm x 2cm grids to line cage
10 crickets, commercial cricket food, water
5 cotton balls
small amounts of Pine-Sol, lemon extract, peppermint extract, and musk cologne

Results
The crickets in the control group moved freely about the cage. The crickets exposed to the lemon extract begame agitated and went to the far ends of the cage. A similar response was also seen with the peppermint, but to a lesser degree. When the crickets were exposed to the musk, they seemed to be attracted to it. Many touched the cotton with their antannae and stayed near the cotton. The crickets exposed to the Pine-Sol acted much like the control.

Conclusions/Discussion
My hypothesis was partially correct in that some of the scents did affect cricket behavior. My hypothesis was incorrect in the effects of the different scents. The crickets seemed to avoid the lemon and to a lessor degree, the peppermint; which I thought would attract them. This can be explained by the fact that I now know that lemon is related to citronella, which is used in insect repellents. I thought that the musk would repel the crickets since it is produced by animals who prey on crickets, however, it seemed to strongly attract them. This may be explained by the fact that some insects, like the scorpion, use a musk-like substance in their mating. I thought the Pine-Sol would repel the crickets because of its strong smell and was surprised to see that they were not bothered by it at all. This may be because the crickets are familiar with pine or only sensed a small portion of it with their antannae. In the future, other scents may be tested which may lead to safer forms of insect control.

Summary Statement
My project is about the affect of different scents on cricket behavior.

Help Received
Mother helped type report; Father helped glue information to board

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
John A. Sherwood

Project Number
J1919

Project Title
The Effects of Roadway Noise on Bird Species Composition and Diversity

Abstract

Objectives/Goals
The project focused on roadway noise from vehicles and its effect on bird species composition and diversity. The main purpose of this project is to find out if increased noise levels affect the number of birds using a similar habitat. The hypothesis is: If noise levels from a constant noise source decrease with distance, then bird species composition and diversity will increase at locations furthest from the noise source.

Methods/Materials
To measure noise levels in decibels (dB), a noise meter was used. Flagging, measuring tape, binoculars, mapping, logbook, and field guide are some of the other materials used. Three transects were laid out at different distances from the roadway noise source (State Highway 94) in coastal sage scrub habitat. Noise measurements were taken at each transect and bird totals by species were observed at three points on each transect during five trials.

Results
It was observed the species diversity and composition was greater at transects further from the noise source. Transect #1 was closest to the road (noise levels of 63-71 dB) had a total of 86 birds in 10 species. Transect #2 (noise levels of 52-58 dB)had 161 total birds with 12 species. Transect #3 was furthest from the road(noise levels of 43-51 dB)and had a total of 147 birds with 15 species.

Conclusions/Discussion
These results support the hypothesis in that there appears to be both a greater number and broader range of species at distances further from a roadway noise soruce. These results could be useful to scientists in the future as the effects of noise on wildlife become an important issue for endangered habitats and species.

Summary Statement
My project looked at roadway noise and its effect on bird species diversity and composition.

Help Received
My dad helped me with the fieldwork.

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Robert J. Weinstein

Project Number
J1920

Project Title
Do Apples, Oranges, Pears, and Bananas Have an Effect on the Reproduction Rate of Drosophila melanogaster

Abstract

Objectives/Goals
My experimental question was #Do apples, pears, bananas and oranges effect the reproduction rate of Drosophila melanogaster (Fruit Flies)#. My hypothesis was that the Fruit Flies would have a greater reproduction rate in the apple.

Methods/Materials
First, I labeled five bottles each of oranges, apples, pears, bananas and control. I then put ten adult Drosophila melanogaster in each bottle. I counted how many adult, pupa and larva there were in each bottle every two days. I did this with a hand lens.

Results
After twenty-nine days, the apples had the highest number 26 of average adult Drosophila melanogaster. The pear came in second with 24 average adults. The banana was third with five average adults. The orange and control had the least number 0.

Conclusions/Discussion
I concluded that when kept in a confined area with the right food, the Drosophila melanogaster species would be able to reproduce at a consistent rate.

Summary Statement
I am testing if D. melanogaster will have a reporduction change in the different types of fruit

Help Received
Mom and dad in transportation and paying

CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Genevieve Y. Williams

Project Number
J1921

Project Title
Ants: Foraging Communication

Abstract

Objectives/Goals
My question was (1) can Argentine ants communicate the size of a bait, and (2) what happens during the recruitment process? Since Argentines are known as fast to discover food resources, quick to recruit, and possessing the numbers to retrieve large food resources, they could also recognize and communicate the size of a bait.

Methods/Materials
(Experiment 1) Using different weights of tuna baits (.1 g, 1g, 10g) at separate times, I counted the number of ants every 5 minutes for 45 minutes after bait discovery. This was repeated 7 times for each bait size during the 5am -10 am time block, 7 for 11 am- 4 pm, and 7 for 5 pm - 10 pm. (Experiment 2) Using different base area tuna baits (1/8 inch^2, ¼ inch^2, ½ inch^2), I counted the number of ants in a highlighted region every 5 minutes for 45 minutes after bait discovery. (Experiment 3) Using different base area tuna baits (1/8 inch^2, ¼ inch^2, ½ inch^2) I observed the ants according to 23 categories of response in a highlighted region every 15 minutes for 45 minutes after bait discovery, then every 30 minutes for the next 4 hours.

Results
The Argentines consistently recruited more ants faster to the relatively larger baits. During recruitment, I found three discernable stages: Stage 1, "Discovery," occurs when the bait is 0-30% covered, Stage 2, "Recruitment," when the bait is 31-79% covered, Stage 3, "Retrieval," when the bait is 80-100% covered.

Conclusions/Discussion
The Argentines recruit more numbers faster to the relatively larger baits, which suggests that the recruitment process begins with a recognition of bait size. It's possible that the ants' circling explorations around all sizes of bait are linked to estimation of bait size. In addition, the recruitment process seems to be guided by the percent of the bait covered, so that the recruitment process abates when the bait is covered 80-100% as in response to a simple stimulus.

Summary Statement
My project researched the foraging communication and recruitment process of Argentine ants.

Help Received
Mother helped photograph ants, take me to Gordon Labs, Stanford, drive to annual conference of Entomological Society of America, San Diego.