CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Athena M. Bell

Project Number
J2201

Project Title
Hummingbirds and Their Feeding Habits

Abstract

Objectives/Goals
The objective of this study is to determine what drought tolerant California native plants Hummingbird's will be attracted to and if it is the sugar level of the plant that attracts them or the color of the plant that attracts them.

Methods/Materials
Three different colored plants (Salvia Greggil, Lavandula multifida and Cape Honeysuckle) were placed out to see which flower the hummingbirds were attracted to. The number of times the hummingbirds ate from each plant over a 30 minute period for seven days was observed and documented. Then the flower buds were placed in a test tube with 40 drops of distilled water the test tube was placed into a pot of boiling water to extract the sugar from the flower. Ten drops of Benedicts solution was then added to each test tube to test for sugar levels, the color changes that revealed sugar levels were observed and recorded.

Results
The Hummingbirds consistently displayed a favorable response to the flower with the highest sugar content the Cape Honeysuckle. They did not favor the dark colored flower the lavandula multifida like I thought that they would.

Conclusions/Discussion
When testing for sugar levels in the flowers the Cape Honeysuckle revealed a consistent rate of high sugar content, so we may conclude that this is why Hummingbirds ate more often from it. This study has helped me to identify which California native plants the Hummingbirds are most attracted to and what flowers I can put in my garden to help preserve and grow our Hummingbird population. In addition it will help all of us to keep a balance in our native eco system here in California.

Summary Statement
By measuring the sugar content within three different flowers I was able to determine what flower Hummingbirds favor and why they favor that flower.

Help Received
I researched and did this experiment on my own. I used the internet to research ways to extract and test sugar levels. My Science teacher reviewed my process.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Alessio C. Bernardi

Project Number
J2202

Project Title
Monkeyface Prickleback Reaction to Predators

Abstract

Objectives/Goals
Fish may use scent to sense their environment. Last year I studied homing behavior in Monkeyface prickleback based on scent. This year was focused on predator avoidance.
My project was to determine if Monkeyface Prickleback could sense where predators are located based on the scent they give off.

Methods/Materials
To do this experiment I had to collect Monkeyface Prickleback in tide pools in Monterey.
Once I did this I took them to the UCSC Long Marine Lab where I performed my tests.
I got water from a tank with a Cabezon in it (the predator). I took this water and I cycled it through one side of a tank and put unscented water in the other half. Then I placed the Monkeyface Prickleback in the front of the tank and waited for it to swim and pick a side.

Results
My results were opposite as expected, because the majority of the fish went directly to the scented part a significant amount of times.

Conclusions/Discussion
The Cabezon tank was a habitat tank, with representatives of an entire California ecosystem. The cabezon was the most important organism in the tank, but many other organisms were present.
I think that the fish might have to choose between completely clean water, and water with a California habitat. They chose the habitat, which in hindsight is not completely surprising.
This experiment should have used water from a tank with only a predator in it, without other confounding factors.
I still learned a great deal from this experiment.

Summary Statement
Fish sense their environment through scents, here I tested if Monkeyface Prickleback can sense and avoid predators using their scent.

Help Received
My parents, who are marine biologists, helped me with this project. They gave me some advice, but did not perform any of the experiments which I did on my own.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Jennifer M. Cresap

Project Number
J2203

Project Title
Planaria: The Race to Regenerate

Abstract

Objectives/Goals
The purpose of this experiment is to discover the different effects, if any, of aloe vera and caffeine on the regeneration of planaria.

Methods/Materials
Planaria, Aloe Vera, Caffeine, Spring Water, Petri Dishes, Dissecting Microscopes, Paper, Scalpel, Sharpie, Glass Slide, Tape

Results
The results for aloe vera showed that the planaria did regenerate, while the results for the caffeine showed that they did not regenerate at all and many died. While the aloe vera regenerated at the same speed as the control group, the 5% and 10% solutions appeared to be healthier. The caffeine killed most of the planaria and none of them regenerated.

Conclusions/Discussion
When 15% aloe vera was added to the surroundings of the planaria, it appeared to be too much for the planaria. The planaria in the 15% aloe vera concentration appeared slower and weaker than the lower concentrations of 5% and 10%. In both trials all of the 0.05% and .1% caffeine planaria died. The 0.01% caffeine concentration did not regenerate fully. It is concluded that caffeine has a negative effect on planaria regrowth and aloe vera has a positive effect in the right concentrations.

Summary Statement
This project tested the effects of aloe vera and caffeine on the regeneration of planaria.

Help Received
My parents bought the materials for me and supervised my project. My science teacher provided me with a microscope and scale.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Makena M. Crimaldi

Project Number

J2204

Project Title

Shark Stopper: The Use of Samarium and Magnesium to Prevent Shark Attacks

Abstract

Objectives/Goals

The Shark Stopper Experiment tested if Samarium or Magnesium attached to a wetsuit, can prevent shark attacks.

Methods/Materials

Based on the shark's senses in it's head, the Samarium block or Magnesium wire attached to the wetsuit was predicted to reduce the number of shark attacks on the wetsuit and the bait. A shovel nose shark (Rhinobatos productus) was feed for five days in a row testing different types of metals and amounts when attached to a wetsuit. The metals included Samarium block, multiple length of Magnesium wire, stainless steel wire, Nickel Titanium wire, and brass tubing.

Results

In days one through four, Samarium and Magnesium keep the shark away, but the Magnesium had a stronger reaction from the shark. On the fifth day, the shark ate all the fish, even the ones with the Magnesium or Samarium near it. This shows that the shark probably got used to the metals and the metals did not bother the shark's electrical sensors anymore.

Conclusions/Discussion

The hypothesis was Samarium block or Magnesium wire attached to the wetsuit will reduce the number of shark attacks on the wetsuit and the bait. The experiment and results proved that the hypothesis was correct. It was correct because the number of shark attacks decreased after putting the Samarium block or Magnesium wire in the wetsuit. Based on the results, Magnesium and Samarium may be useful in wetsuits to reduce shark interactions and attacks. However, additional testing must be done on bigger sharks.

Summary Statement

The Shark Stopper Experiment studied the effects of Samarium and Magnesium on a shovel nose shark during feeding to simulate if shark attacks could be reduced with the use of these metals.

Help Received

Dr. Chris Lowe at CSU Long Beach, Dr. Andrew Nosal at UC San Diego, and Dr. Patrick Rice at Florida Keys Community College all provide information on sharks and reviewed the test plan. Encinitas Tropical Fish Store provided access to the Shovel Nose Shark.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Kaitlin A. Dean

Project Number
J2205

Project Title
Stop and Smell the Roses: How Choosy Are Insects about Scent?

Abstract

Objectives/Goals
The objective of my project is to determine what scent insects are most attracted to.

Methods/Materials
I chose to test five different scents: blood orange, exotic spices, vintage rose, fresh berries, and rosemary mint by trapping insects in bowls of scented water. I placed six yellow bowls (one for each scent plus a control bowl) randomly in five locations. I chose yellow bowls because I determined in last years science fair project that insects are most attracted to the color yellow. I used clear, harder plastic bowls inside of the yellow bowls because the scented oils were found to burn holes through the thin yellow bowls alone. The bowls were filled with water, a few drops of plain, non-scented dish soap and one teaspoon of the scented oil. After two days, I counted and sorted the insects trapped in each bowl. Finally, I ran this experiment twice so that I had ten trials in total for each scent.

Results
The results indicated that the exotic spices scent attracts slightly more insects than the other five scents and the control group that was tested. One unexpected result of the experiment was the attraction of bees. Two scents, exotic spices and fresh berries, trapped 82.5% of all of the bees. These were the scents that trapped the greatest and least number of insects and had the largest differences from the control group. This is an indication that scent does affect some insects.

Conclusions/Discussion
It is difficult to conclude that spicy scents always attract the most insects because it did not attract significantly more insects than the other scents. Bees, however, were significantly more attracted to two scents: exotic spice and fresh berries. Although I was unable to clearly attain my objective when looking at insects as a whole, the results of the bees provided a result that may be helpful if trying to attract pollinating insects to a home garden.

Summary Statement
Using prior knowledge of color preference, I showed that scent can affect the attraction of certain insects.

Help Received
I created and executed the project on my own.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Mason S. Dougherty

Project Number

J2206

Project Title

The Effects of Various Dietary Supplements on the Longevity of Drosophila melanogaster

Abstract

Objectives/Goals

The objective of this project is to determine if certain dietary supplements increase the longevity of Drosophila melanogaster.

Methods/Materials

There were 15 vials containing 10 specimens each of Drosophila melanogaster. Acai extract, fish oil, ginseng herbal extract, and green tea extract were the supplements used. Each supplement was placed in 3 vials along with prepared Drosophila food, as well as 3 vials of Drosophila food as a control. The number of living versus nonliving Drosophila in each vial was recorded daily to determine the average life span per vial.

Results

Acai extract proved to have the most positive effects on increasing the longevity of the Drosophila melanogaster, as compared to the control and other supplements tested.

Conclusions/Discussion

My hypothesis proved to be correct in that acai extract had the most positive effects on longevity. However, ginseng extract and green tea extract also showed increased longevity as compared to the control. This experiment showed that some dietary supplements can have positive effects on the longevity of Drosophila melanogaster. This may also suggest similar effects on humans due to the similarities between human genes and Drosophila genes.

Summary Statement

I showed an increase in the longevity of Drosophila melanogaster with acai extract and other dietary supplements.

Help Received

I prepared the Drosophila melanogaster vials and recorded logs daily myself. I got help comparing the average lifespan using the statistical data from Carl Gong, science coordinator.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
David S. Gao

Project Number
J2207

Project Title
Drosophila melanogaster Addiction to Sugar

Abstract

Objectives/Goals
Sugar addiction has become an epidemic problem causing many adverse effects on human health as well as financial and economic burdens for the families and society. The objective of my project is to identify factors that can affect sugar addiction using a Drosophila Melanogaster (fruit fly) model. My hypothesis is that D. Melanogaster prefers physiological concentration of sugar; however, different food flavors and long-time feeding can make them prefer higher concentrations of sugar.

Methods/Materials
I used a model of D. Melanogaster sugar addiction. I placed 4 pieces of equal size filter paper into 4 equally divided areas in each petri dish. I added the tested solutions to different papers, and 80 to 100 flies into each petri dish. I recorded the number of flies in each area of the petri dish after different lengths of feeding times. I tested different concentrations of sugar with and without common food flavors including banana, cinnamon, chocolate and salt. The experiments were independently repeated several times, each with 3 repeats. The results were analyzed by comparing different treatment groups with statistical calculations using the Microsoft Excel Program. I further modeled the trends of sugar preference over time.

Results
Flies preferred physiological levels of sugar at early feeding times. Only cinnamon induced flies to prefer lower concentrations of sugar while banana, chocolate and salt had no effect. However, after long-time feeding, flies preferred higher concentrations of sugar (above physiological levels) regardless with or without food flavors.

Conclusions/Discussion
My overall hypothesis is correct. Although flies might normally prefer physiological levels of sugar, long-time feeding of sugar can induce addiction of flies to sugar. These observations have implications to human behaviors: as you taste or eat more sugar, you become more addicted to it. Therefore, proper control or abstention of sugar consumption can avoid sugar addiction and is likely to improve human health.

Summary Statement
I tested the preference of fruit flies to different concentrations of sugar under different food flavors overtime and found that flies became addicted to higher concentrations of sugar after long-time feeding regardless of what food flavors

Help Received
My science teacher Ms. Wong provided guidance for my project. My parents provided moral support.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Benjamin J. Hewitt

Project Number

J2208

Project Title

Indications of Laterality in Bipedal Dinosaurs Using Gait Analysis from Dinosaur Trackways

Abstract

Objectives/Goals

The objective of this project is to determine whether certain types of bipedal dinosaurs may have shown laterality which would likely indicate handedness, or right vs. left limb preference.

Methods/Materials

Measuring tapes (cm), protractor, pencils, paper, established Symmetry Index formula. Multiple measurements were taken of each track way. Left and right measurements were put through the symmetry index formula to determine whether the track way showed asymmetry in the tested measurement.

Results

I was able to collect 42 individual pieces of data (measurements) based on fossilized footprints. I measured for stride, pace, pace angulation, track length, track way width, number of footsteps in each track way, track width, toe angle and pace angle. However, after inputting all measurements into the symmetry index formula, only one showed significant asymmetry. Therefore, I was not able to conclude that bipedal dinosaurs showed laterality, or limb preference (handedness). However, given the limited number of authenticated track ways to which I had access to measure, it is possible that further research of additional track ways could yet conclude that such animals did show laterality / limb preference.

Conclusions/Discussion

A recently published (2015) study about kangaroos and wallabies concluded, for the first time, that laterality and handedness exist in animals other than apes. As bipedal dinosaurs are the only other bipedal animals with manipulative upper limbs (other than wings in birds), if it were possible to determine if they exhibited handedness (or limb dominance / preference), it would enhance our understanding of how these extinct animals manipulated the environment around them, and interacted with one another.

Summary Statement

Through measurements of authenticated fossilized bipedal dinsoaur track ways, I sought evidence of gait assymetry to determine indications of laterality and handedness, but was unable to find significant assymetry.

Help Received

My parents provided assistance by driving me to locations in Utah and Arizona. Andrew Milner, Site Paleontologist at the Dinosaur Discovery Site and Johnson Farm, allowed me access beyond the public areas and onto the actual trackways, and also shared information about the trackways and reviewed my

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Celeste N. McDougal

Project Number
J2209

Project Title
Changes in Arthropod Biodiversity: A Behavioral Study

Abstract

Objectives/Goals
The objective of this study was to find the variables that cause arthropod biodiversity in a sample field to change.

Methods/Materials
4 flags
1 barrel hoop (20 inch diameter)
2 separate notebooks, the first one having been destroyed in the rain.
Once an hour from sunrise to sunset for several days, samples were taken at each site (marked by flags). The number and type of arthropods in each sample was noted, as was the temperature and weather.

Results
There was a winter sample run and a spring sample run, with 4 days in each. Since I was looking at biodiversity, when making my charts I paid more attention to the number of arthropod species, rather than the number of arthropods, found. There were more arthropod species found nearer to the center of the field, and nearer to the peak of the day (when it was warmest), than other places and times.

Conclusions/Discussion
There appeared to be quite a strong association between the distance from the forest and the biodiversity. As for why there were more species at the peak of the day, there could be many hidden variables, such as the number of hours since dawn, or the intensity of the sun. It is hard to tell if there was a real correlation between temperature and biodiversity. Since it's not possible to use a control in this situation (one cannot replicate an entire field with temperature controls, etc), we can only extrapolate from the data.
As for how this furthers scientific knowledge, this study shows quite a lot about the behavior of many of these types of arthropods, for example, there are more arthropod species out and about when it tends to be warmest. One could attempt to better manage pest control, avoiding killing multiple species with a pesticide by using it later in the day. Further studies could be done, building on this one. The possibilities are limitless and, to be honest, this was fun to do.

Summary Statement
Both temperature and distance from the forest appear to affect the arthropod biodiversity in a field.

Help Received
I recieved no professional help with my research

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Elise S. Miller

Project Number
J2210

Project Title
Worms Can Survive a Drought. Can You?

Abstract

Objectives/Goals
Due to the current drought conditions in California I wanted to see what the effects were on worms.

Methods/Materials
I made 15 individual worm environments. Five environments had a worm population living under normal soil conditions, five environments had a worm population where the moisture level fluctuated from normal to dry and five environments had worms living under drought conditions. I measured and recorded the moisture level every Tuesday, Thursday and Saturday. Every 21 days I examined each individual environment and took a census of the worm population. I repeated this process three times for a total of 63 days.

Results
Under drought conditions worms secrete a mucous membrane around themselves and go into a state of estivation, similar to what animals do in hibernation. By building the mucus membrane around themselves, they create a moist protective coating that allows the worms to survive drought conditions. The worm mortality rate under normal conditions was 0% all 125 worms survived. The worm mortality rate under the normal to wet conditions was 0% all 125 worms survived. The worm mortality rate under drought conditions was 12.8% over the 63 days leaving 109 worms surviving the drought conditions.

Conclusions/Discussion
The experiment proved my hypothesis true. Worms can survive a drought. With California experiencing its fifth straight year of drought conditions this is vital information. Soil with a worm population absorbs more water and decreases water runoff. This is vital to Earth's environment by benefiting the fauna and flora of the planet.

Summary Statement
This project was to prove worms can survive a drought.

Help Received
My parents Mr. James D. Miller Jr. and Mrs. Brenda K. Miller helped me gather all supplies I needed. My parents also critiqued my presentation.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Lily C. Oglesby

Project Number
J2211

Project Title
How Does Variation in Water Salinity Affect the Survival Rate of Mosquito Larvae?

Abstract

Objectives/Goals
The purpose of the experiments was to show how the C. tarsalis mosquito could potentially adapt to changing conditions of salinity in a controlled experiment.

Methods/Materials
Materials: 15 containers, Culex tarsalis eggs, mosquito food, 4,800 ml double distilled water, instant ocean sea salt, refractometer

Experiment 1: Fill cups with double distilled water, and different amounts of instant ocean depending on desired salinity. There are 3 cups for every salinity. Once hatched, place 15 mosquito larvae in each cup. Each day measure salinity with refractometer, and count the larvae still alive at each salinity in each cup.

Experiment 2: Fill 3 cups with double distilled water and place 15 larvae in each. Every other day increase the salinity by 6-7 ppt using a refractometer and instant ocean. Each day count the larvae still alive in each cup.

Results
Experiment 1: The mosquito larvae in 17.1% seawater survived in the highest number. The larvae in double-distilled (fresh) water survived second best, and some of the larvae in 31.4% seawater survived, but at a significantly reduced number. All of the mosquito larvae put in 40% seawater and higher died on the first day.

Experiment 2: All of the larvae survived until 25% seawater, and then gradually started to die. The last mosquito larvae died at 66% seawater.

Conclusions/Discussion
The mosquito larvae in experiment 1 were never given a chance to adapt to increasing salinities, but were instead placed in the high salinities immediately. This led to a low survival rate. In experiment 2, the larvae were given a chance to adapt and grow more mature, and survived in much higher salinity. In the future, if the drought continues in the Coachella Valley, the mosquitoes will experience higher salinities. The current study gives important information on the salinity at which C. tarsalis can survive, and how mosquito larvae may adapt to increased salinity. Mosquito control districts may benefit from this information by helping them understand the preferred habitats of the C. tarsalis mosquito larvae, and help them make better decisions on mosquito control.

Summary Statement
This project is to test how C. tarsalis mosquito larvae survive and adapt to changing water salinity in a controlled experiment.

Help Received
Jennifer Henke from the Coachella Valley Mosquito and Vector Control District supplied the mosquito eggs for the study, and explained how best to raise mosquito larvae at home. My parents discussed the project with me, helped with the procedure and constructing the display.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Haylee A. Perryman

Project Number

J2212

Project Title

Nitrates: A Study of Fish Growth

Abstract

Objectives/Goals

The objective of this study was to determine the growth rate percentages by weight to a common goldfish raised in nitrate rich well water vs. purified drinking water with a minor study on the role aeration plays within these samples.

Methods/Materials

Ten individual 1-gallon tanks, ten common goldfish - five tanks of nitrate rich well water & five tanks of purified drinking water. Aeration source for two of each water types. Weighed fish on calibrated, digital gram scale to plot growth rate percentage by weight over the course of the study. Provided fish with a calibrated amount of food to provide equal opportunity for growth throughout the sample size.

Results

The weights of the ten common goldfish were plotted over the course of the test period and results compared. The five fish raised in purified drinking water exhibited an average growth weight percentage average of 68.5% vs. the nitrate rich well water raised fish growth weight percentage average of 59.9%. The aerated water had little to no affect on the fish growth weight percentage across my sample size.

Conclusions/Discussion

Based on my sample size of ten common goldfish, the growth weight percentage of the five subjects raised in purified drinking water proved to be greater. These results may point to a negative growth affect to fish subjected to a fed water source known to contain high nitrates such as lakes located near agricultural fields.

Summary Statement

I proved fish raised in nitrate rich well water exhibit a lower growth weight percentage than those raised in a purified water source

Help Received

I performed my own research and accepted minimal assistance from my father during the setup of my experiment at home

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Joshua Risk

Project Number
J2213

Project Title
Modeling Stem Cell Growth in a Reclaimed Water Environment Using Girardia tigrina (Planaria Flatworm)

Abstract

Objectives/Goals
The objective of this study was to see if the regeneration of planarian flatworms were affected by the use of reclaimed water rather than spring water. The regeneration ability of planarians is used to model stem cell behavior.

Because of California's drought, reclaimed water is being used for irrigation. I wanted to test to see if reclaimed water could also be consumed. I used the planarians to model human ability to consume this.

Methods/Materials
38 planarian flatworms, spring water, reclaimed water, scalpel. I performed bisected the planarians and observed their regeneration into multiple specimens in both a spring water and reclaimed water environment.

Results
When I performed surgery to the 38 planarians, all 76 specimens started to regenerate and move with 4 days of exposure to spring water. Within 2 weeks, 72 planarians had fully regrown.

I bisected the 72 planarians and placed them in reclaimed water. Within 4 days, all 144 specimens began to move. 142 planarians had fully regrown within 2 weeks.

Conclusions/Discussion
Planarians normally live in spring water. In my experiment after surgery, it took four days for all the planarians to be moving around, then about 2 weeks total to fully regenerate.

The use of reclaimed water appears to have no effect on the cellular regeneration of planarian flatworms.

Summary Statement
The cellular regeneration of the planarian flatworm was not affected by using reclaimed water rather than spring water.

Help Received
I performed the experiment by myself; my mother helped me with my graphs.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Ryan J. Scott

Project Number

J2214

Project Title

The Chicken and the Egg: Solar Lights in Chicken Coops Can Double Food Supply for Families in Third World Countries

Abstract

Objectives/Goals

Chickens need 14 hours of light to lay the the optimal amount of eggs. They get this in the summer, and lay over twice as many eggs then. My goal was to trick the chickens into laying the optimal amount of eggs in the winter by adding three hours of extra light to their coop at night. My hypothesis is that I believe the additional light will cause them to lay like they do in the summer.

Methods/Materials

The materials in my project were 5 chickens, a 40 watt bulb, an extension chord, and a chicken coop. I collected the eggs in the winter, before I added light in their coop, and recorded my findings. Then I added a 40 watt bulb in their chicken coop, and as it got dark at 5:00p.m. I then turned it on. Three hours later, at 8:00p.m., I turned it off. I checked the eggs in the morning, and recorded my findings. I continued doing this for the next three weeks.

Results

The results show that since I added the extra light to the chicken coop they started laying as many eggs as they do in the summer. Most of the time I get five eggs again, as opposed to two or three eggs. This is now one egg per chicken again. The extra light stimulates the pituitary gland behind their eyes, which creates a hormone that gets sent to the overies. This sets egg production in motion.

Conclusions/Discussion

My conclusion shows that chickens can be tricked into laying the maximum amount of eggs by adding extra light into the coop at night during the winter. This makes them think it's a 14 hour day, which they need in order to do this. Chickens are born with a quota, or a certain number of eggs they will lay in their lifetime. If the extra light is added every winter they will meet their quota earler in their life, and they will stop laying at a younger age. If the U.S. donated small, inexpensive solar lights to hungry families in third world countries, who may only have chickens as their main food source, these families could double their egg production daily. Doubling the amount of eggs could make a big difference in the lives of these parents who struggle to feed their children.

Summary Statement

Adding inexpensive, U.S. donated solar lights to chicken coops in the winter can double the amount of eggs to help feed hungry families in third world countries, who may only have chickens as a food source.

Help Received

I interviewed the staff at Cowboy Corral, in Yucca Valley. They suggested turning the light on in the morning because the light going off at night could give them anxiety. I made the decision to turn the to turn light on at night. Otherwise, I would have to shut their door, and I thought that could give them

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Andrew Sloniger; Cyrus Snyder

Project Number

J2215

Project Title

Nature vs. Tech

Abstract

Objectives/Goals

My project is about fish called African Cichlids that protect their young and raise their eggs, by incubating them with their mouths. I want to know if Artificial Incubation is has a better survival rate than their natural technique. The reason I want to know this is so that scientists can breed these the fastest way, in order for them to reintroduce some of the endangered species of cichlids into the wild.

Methods/Materials

Egg tumbler
Fish tank over 30 gallons
Filters that suit for how many gallons/fish you have
Water with qualities of PH of 7.4-8.4, Nitrate levels under 10, and Ammonia levels under 1.0 from your filters
Male and Female cichlids of the same species

Results

Artificial Incubation was much more successful than natural. We provided 4 trials of tests for the mouth-brooding mother cichlid to hold the egg, and 4 trials of tests for the Artificial Incubator. Over a period of 15 days for each trial, our results showed that the mother cichlids spat the eggs the first 3 times. The last time one of the cichlids did not spit the eggs, but held them. That gave the natural holding process bad results. The Artificial Incubation was always around 80 percent survival rate.

Conclusions/Discussion

Our hypothesis was correct
The mother was not as able to hold and protect the eggs as well as the incubator
The research said that the mother spat three times because of all the stress she undertook
The stress was from the other fish and hunger
The incubator had no problem with the eggs and most of them were healthy
We think that the mother might have been under too much stress before the breeding started
Mothers are all still healthy and well
Captive cichlids may have more stress because the environment and other fish
We should have made the mother be alone so that the stress would not be a factor
We should have put the mother alone
Future research that we would do is that we would have many more females that we could test so the three

Summary Statement

My project is about fish called African Cichlids that protect and incubate their young with their mouths: I want to know if that technique is better than man made incubation process; than scientists could reintroduce them fast for the wild

Help Received

Dr Felix Lapuz, Elizabeth Conrad

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Bella L. Slosberg

Project Number

J2216

Project Title

Mealworm Madness: Are Mealworms Able to Ingest and Digest Polystyrenes Safely?

Abstract

Objectives/Goals

The objective is to determine if mealworms are able to digest and ingest polystyrenes safley and without adverse health effects.

Methods/Materials

Eight colonies, each containing 780 mealworms, were set up in December. These colonies were fed at the same time and the same type of food and kept in the same environment. The manipulated variable was the type of substrate. Two colonies with an all-bran substrate were the control group. There were two colonies with half bran and half Styrofoam, two colonies with bran and Styrofoam chunks, and two colonies with just Styrofoam. Over 47 days observations of health and activity took place regularly and colony growth was calculated.

Results

All colonies were healthy. The four colonies with a bran and Styrofoam mix had more beetles than the control group. Two of those colonies had Styrofoam chunks and the highest level of beetles. These colonies were generally more active than any of the other colonies. The all Styrofoam colonies had the highest level of mealworms and least amount of dead mealworms.

Conclusions/Discussion

My hypothesis was incorrect. My results showed that all of the colonies were healthy and able to digest and ingest polystyrenes. The gut bacteria of the mealworms are able to break the polystyrenes, and this could have global impacts for dealing with the plastics problem. I#ll continue my project by taking the by-products of the colonies and using it as a fertilizer for plants. I#ll look to see if this results in different amounts of growth for the plants.

Summary Statement

I tested and to see if mealworms couid digest and ingest polystyrenes safley, I found out that mealworms eating polystyrenes had no negitive efficts on them, however, a 100% polystyrene diet slows down the mealworms life cycle.

Help Received

I farmed designed, presented, and composed my board on my own. I also raised my mealworms on my own. Myr and Charles Slosberg purchased my supplies. I got suggestions on how to inprove my project by WeMinWu, Charles Criddle, Nicha Huxtable Potter, Matt Inman, and Schatzi Sovitch.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Harsha V. Thangavijayan

Project Number
J2217

Project Title
Can Light Control Heart Rate?

Abstract

Objectives/Goals
The objective of my experiment was to find out if red light, blue light, and UV light had the ability to affect the heart rate of Daphnia magna. My goal was to find a non-invasive approach using only light, as opposed to gene therapy to control the heart rate.

Methods/Materials
The materials I used for my experiment were 20 Daphnia magna, microscope, red filter, blue filter, UV torchlight, and a timer handled by a helper. Place your first test specimen on the microscope and record the heart rate for 15 seconds. Repeat this 2 more times. Place the red filter on the stage light, and let the Daphnia magna be exposed for 2 minutes. After 2 minutes, count the heart rate for 15 seconds. Repeat this twice more with a 45 second interval. Remove the red filter and let the Daphnia magna be exposed to stage light for two minutes. After two minutes, place the blue filter and let the specimen be exposed for two minutes. Count the heart rate three times for 15 seconds with a 45 second interval. Remove the blue filter and let the Daphnia magna be exposed to the stage light for 2 minutes. Mount the UV torch and expose it on the Daphnia magna for 2 minutes. Count the heart rate thrice for 15 seconds with a 45 second interval. Repeat the entire procedure using 19 different Daphnias, recording their heart rate under all three lighting conditions with the same amount of time specified above.

Results
My hypothesis was supported by the results as the heart rate of Daphnia magna increased. I statistically analyzed the significance of the effect of light upon the heart rate using a paired one-tailed t-test, which showed that the heart rate was significantly higher on exposure to blue light, red light, and UV light.

Conclusions/Discussion
This experiment has so much potential in the future because it can revolutionize the way we study the heart, which could save millions of people with cardiovascular diseases. Big journeys start with small steps, and since my experiment was a success, researchers can even find a way to control the beating of the heart without gene therapy. I also successfully used a non-invasive method to affect the hearrt rate using only light, just like I unvisioned.

Summary Statement
I proved that a non-invasive method such as red, blue, and UV light could significantly increase the heart rate of Daphnia magna, and can act as the basis to find a non-invasive way to control heart rate using only light.

Help Received
Dr. Bub, from the University of Oxford provided valuable feedback throughout my experiment and gave me the idea of conducting a t-test.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Eva M. Weller

Project Number
J2218

Project Title
The Effects of Disc Golf on Plethodontidae Salamanders

Abstract

Objectives/Goals
My project studied the effects of disc golf on plethodontid salamanders. My hypothesis was that, because of the constant passage of players, salamanders would be less likely to find a fitting habitat in the disc golf area of the forest.

Methods/Materials
I surveyed for salamanders by searching for a half hour in a section of the disc golf course and another half hour searching within a non-golf section of the Arcata Community Forest. At each section, I would turn over cover objects with a width larger than 8 centimeters and record the species and number of salamanders. I measured the width and length of each object and recorded results in a waterproof data notebook, while recording my position with a GPS. I repeated this process in both golf and non-golf areas a total of six times each.

Results
I found salamanders under 22.8% of logs I looked under in the golf area, which was about the same as in the non-golf area at 20.8%. Salamanders preferred larger objects: the average area of objects with salamanders underneath was 2,241 cm^2 while the area of objects without salamanders was 1,374 cm^2.

Conclusions/Discussion
My hypothesis was incorrect, the number of salamanders in the non-golf and golf areas was about the same. My study showed that a healthy salamander habitat can be a variety of things, but I also learned that as long as there is large pieces of wood on the ground, a salamander should be able to find suitable cover.

Summary Statement
I found that the impacts disc golf did not have a large effect on plethodontid salamanders in a redwood forest.

Help Received
My parents drove me to the forest and helped record data while I did surveys. My dad showed me how to make graphs and helped edit my information before it went on my board.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Alexandra P. Orczyk

Project Number

J2299

Project Title

Investigating Impacts of Human Intrusion on Lottia gigantea Populations

Abstract

Objectives/Goals

I heard of an intertidal animal, the owl limpet, that was at risk due to poaching, and I wanted to learn more about this species. Owl limpets start out juvenile with no gender, and gradually grow to become male and later female, so size-selective poaching leads to a skewed population with not enough females to reproduce. I documented two areas at the Point Loma Tide Pools, one with many visitors (~200,000 annually) and one with fewer (~20,000 annually), to see if there was a difference in either the sizes or numbers of owl limpets. I collected data both in the middle tide zone, as I thought I'd see more females there, and in the high tide zone, as I thought I'd see limpet recruitment there. I believed that the area with fewer visitors would have both more owl limpets and a larger average size.

Methods/Materials

By documenting 1,500 grid squares in 60 half-meter square quadrats, I counted 109 owl limpets in the middle tide zone and 171 in the high tide zone. I laid down quadrats and noted the number and sizes of owl limpets in each grid square. I did this in both Zone 1 (more visitors) and Zone 2 (fewer visitors).

Results

Surprisingly, there was no statistically significant difference in sizes or numbers of owl limpets between Zones 1 and 2. However, there was a significant difference in sizes between the high and middle tide zones. The percentage of mature owl limpets varied: Zone 2 (with fewer visitors) had more mature owl limpets than Zone 1. The high tide zones generally had more juvenile owl limpets than the middle tide zones. I think this could mean that there is limpet recruitment in the high tide zone; more juvenile owl limpets living in the high tide zone, slowly growing larger and later replacing the mature owl limpets dying off in the middle tide zone.

Conclusions/Discussion

It seems that at Point Loma, the difference in the number of visitors does not have a significant effect on the owl limpet population. I think this may be because Point Loma is protected and visitors here learn about minimizing their impact on the environment. This shows that if we protect more intertidal areas and educate visitors, we can help conserve owl limpets. Progress is being made, but more work needs to be done to help these delightful creatures.

Summary Statement

I found that at the Point Loma Tide Pools, human intrusion does not seem to have a significant effect on the owl limpet populations.

Help Received

My science teacher lent me some materials, and my mother drove me to the tide pools. Two marine biologists at Cabrillo National Monument gave me helpful advice as well as long term data to compare my results to.