CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Sofia R. Aiello

Project Number
J2201

Project Title
Lagoon Bird Species Diversity at High vs. Low Tide

Abstract

Objectives/Goals
While observing birds at a local lagoon, I noticed that the overall bird abundance and diversity seemed to differ at high versus low tide. I was interested to learn more about how the tide impacts shorebird activity. I hypothesized that there would be a significantly greater diversity of bird species at low tide. I also believed that migratory bird species might be found in a closer proximity to the trail at low tide.

Methods/Materials
I observed a total of 23 different bird species over a period of several months and many visits to the lagoon. I used a notebook, binoculars, laser range finder, and bird field guide to observe birds. I used an anemometer, hygrometer, and thermometer to measure wind speed, wind chill, humidity, and temperature. I used a three-way meter to measure light, moisture, and soil pH.

Results
Over several months, I observed 23 different bird species and 391 individual birds. I discovered that there was much larger bird diversity at low tide than at high tide. I observed 21 bird species at low tide and ten bird species at high tide. I also noticed that most of the migrant birds were seen at low tide and that the close proximity of the visitors' trail did not seem to inhibit the migrant bird species or even many of the threatened bird species in their activity.

Conclusions/Discussion
From these results, I concluded that at low tide there may be greater bird species diversity observed and a greater total number of birds seen. The tide level did not seem to deter the birds even when they were exposed to greater proximity to the trail. I would recommend more tests at several different wetland environments to provide more accurate results. This project can be altered or continued to learn more about the effects of tides on bird abundance, diversity, and density.

Summary Statement
My project documented the impacts of high and low tides on bird species diversity and abundance at a local lagoon.

Help Received
Science teacher, local bird watchers of the San Elijo Lagoon, and family helped observe bird species.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Alessio C. Bernardi

Project Number
J2202

Project Title
Homing Behavior in Monkeyface Prickleback, Cebidichthys violaceus

Abstract

Objectives/Goals
My main question was to see if Monkeyface pricklebacks could OhomeO by using their own chemical trail. I setup a choice experiment with clean and OscentedO water in a tank. I found that the fish much more often went to the OscentedO water than the OunscentedO water.

Methods/Materials
Eighteen fish were collected in the intertidal in Pacific Grove, and brought back to the lab. An aquarium was setup with three compartments, one contained the initial fish and two had clean and "scented" water where the fish could swim. Each test lasted ten minutes.

Results
Six fish did not move and were not used in the analysis. Two fish swam to the unscented compartment, ten fish swam to the scented compartment. A Chi square test showed that this results was statistically significant.

Conclusions/Discussion
My experiment shows that fish seem to be more attracted by water with a home smell, than unscented water. This may explain the homing behavior that has been described before in this species.

Summary Statement
I studied homing behavior in Monkeyface prickleback fishes, with a choice experiment where fish would choose between clean or scented (home) water.

Help Received
Used lab equipment at the University of California Santa Cruz with my Dad.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Emma K. Compton

Project Number
J2203

Project Title
Ochre Star: Is the Population Still Devastated?

Abstract

Objectives/Goals
The goal of my project was to examine the different ways Sea Star Wasting Syndrome affected the species of the sea star known as Pisaster Ochraceus. I believe that the effects of the disease will lessen over time.

Methods/Materials
Materials:
meter tape, ruler, category chart
Methods:
Prepare one of two plots during a negative tide located at Natural Bridges State Beach by using a meter tape to outline the perimeter. Examine the plot by counting the number of sea stars, measure the size (using the radius), and categorize the health of the sea star. Repeat this procedure for the second plot. Lastly, analyze recent and past data from other northern California locations and compare it to the data gathered from Natural Bridges.

Results
My findings were relatively similar to other locations. Most of the sea stars found throughout northern California were juveniles and the overall populations increased. However, there was a difference in the percent diseased at each location.

Conclusions/Discussion
In conclusion, I found that the effects of Sea Star Wasting Syndrome are decreasing. Perhaps sea stars are reproducing offspring that are immune to the wasting disease. Perhaps salinity, water temperature or pollution affect the sea star population.

Summary Statement
The past and present effects of Sea Star Wasting Syndrome on the Pisaster Ochraceus sea star in northern California.

Help Received
1) My mother supervised me during the data collection 2) Laura Anderson from UCSC Long Marine Lab Ecology and Evolutionary Biology for lending me equipment and teaching me how to monitor accurately. 3) Melissa Redfield from UCSC Long Marine Lab Ecology and Evolutionary Biology for providing me

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Kaitlin A. Dean

Project Number

J2204

Project Title

It's a Colorful World: How Choosy Are Insects about Color?

Abstract

Objectives/Goals

The purpose of my project is to determine what color insects are most attracted to: white, red, orange, yellow, green, or blue. The reason I am doing this investigation is to discover if having certain colors in my home and in my garden will be likely to attract or deter insects.

Methods/Materials

Place 1 bowl of each color (white, red, orange, yellow, green, and blue) in 5 predetermined random locations. Fill each bowl with water and several drops of dish soap, and leave undisturbed for 2 days. Collect the bowls and with an eye dropper, remove, count, and sort the trapped insects in each bowl. Analyze and graph the data to determine which color insects prefer.

Results

The results indicate that yellow attracts more insects than the other 5 colors that were tested. Out of the 2,207 insects that were trapped in the 30 bowls, White attracted 5.7%, Red attracted 4.2%, Orange attracted 22%, Yellow attracted 51.3%, Green attracted 7.2%, and Blue attracted 9.6%.

Conclusions/Discussion

After completing my investigation on what color insects are most attracted to, I found that my hypothesis was incorrect. My hypothesis stated that white would attract the most insects. Instead, I found that only 5.7% of the insects that I trapped were attracted to the color white. Yellow was actually the color that attracted the most insects (51.3%). Red, white, blue, and green were not significantly different in the number of percent of insects trapped; however, orange and yellow trapped quite a bit more insects. After my investigation, I would recommend avoiding the color yellow unless you are trying to attract a lot of insects.

Summary Statement

The purpose of my project is to determine what color insects are most attracted to: white, red, orange, yellow, green, or blue.

Help Received

No outside help.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Akshaya Ganesan

Project Number

J2205

Project Title

Feeding Earthworms (Eisenia fetida): Do Different Diets Affect the Nutrient Levels of the Vermicompost?

Abstract

Objectives/Goals

The purpose of this project is to find a good diet for the farmers' friends, the best composting worms, the red wigglers or red worms-Eisenia fetida. Vermicomposting plays a major role in organic farming. The big question is what is the significance of the different diets of earthworms on the nutrient levels of their vermicompost?

Methods/Materials

The red wigglers in the experiment were fed with three different foods-fruits and vegetables (FV), tea filters (TF), and leaf litters (LL) and the major nutrients of the soil were tested and compared to control-soil with no compost (C). The worms were raised following the guidelines of Cupertino City Services and the compost was tested for pH, Nitrate (N), Phosphorus (P), and Potassium (K) using a soil testing kit.

Results

Results showed that the pH was alkaline (FV-7.5, LL-6.2, and TF-7) in all the different diets compared to the acidic pH of the control (C-5). The worms fed with fruits and vegetables showed the highest level of nitrate and phosphorus while the highest level of potassium was in the leaf litters bin. The bins with fruits and vegetables and the leaf litters had a higher level of NPK compared to the tea filters. The control had very low or no NPK at all.

Conclusions/Discussion

The results prove that vermicomposting had increased NPK considerably. Evidently, the experiment shows that different diets do affect the nutrient levels of the vermicompost. By doing this experiment I learned about vermiculture and the best diets for red wigglers. This is my first step in growing my own garden and I#m planning to continue my research using compost in my vegetable garden with the motto, #I GROW MY FOOD.# My conclusion is, if everyone has a compost bin at home and follow #I GROW MY FOOD# method, we can recycle the kitchen wastes effectively, trust the organic food we eat and lead a happy and healthy life.

Summary Statement

Vermicompost, a promising alternate for chemical fertilizers - the first step towards Akshaya's organic garden "I GROW MY FOOD"

Help Received

My mom and dad for the moral support and encouragement.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Benjamin J. Hewitt

Project Number

J2206

Project Title

Retention of Larval Stage Conditioning in Post-Metamorphic Pieris rapae Butterflies

Abstract

Objectives/Goals

My objective was to determine whether Pieris rapae butterflies can retain memories of experiences from their larval stage.

Methods/Materials

Pieris rapae eggs were obtained and hatched on home-grown radish sprouts. At their 4th instar, they were separated into control and conditioned groups, and were moved into different habitats with organic brussels sprouts. The conditioned group was placed on electrically conductive agarose gel in a container through which the scent of ethyl acetate (EA) was pumped while a mild electric current went through the agarose gel. Following 3 rounds of conditioning, the groups were labeled #A# and #B# so that this would be a blind study for me. The groups were tested (1) to see if the caterpillars had an instinctive aversion to the scent of EA and (2) if not, whether the conditioning had worked such that one group tended to avoid the EA scent. The caterpillars were then allowed to go through metamorphosis. 24 hours after hatching as butterflies, each insect was tested for aversion to the EA scent and then released. The study was repeated three times, each time as a blind study. Group identities were revealed to me only after the completion of the 3rd study.

Results

Based on my study, Pieris rapae butterflies do not have any instinctive aversion to the scent of EA, but when conditioned to have a negative experience with it, they can and do retain those memories through metamorphosis.

Conclusions/Discussion

Studies have shown that almost all of a caterpillar#s brain is liquefied during metamorphosis, other than the parts that control certain muscle movement. My study shows that even if the brain matter is liquefied, it has a way of storing memories. Recent studies have also shown that memories are stored not in the synapses, but inside individual neurons. The results of my study are consistent with this recent scientific learning, which could explain how butterflies can recall memories learned prior to metamorphosis.

Summary Statement

My project was testing whether Pieris rapae butterflies can retain memories of conditioning from their larval (caterpillar) stage.

Help Received

My parents (driving, supplies); family friend (cutting pipes and windows in the butterfly testing apparatus); Cory Tobin (supervision with agarose gel).

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Joseph A. Huitt

Project Number
J2207

Project Title
Honey! Where Is All the Honey? The Effect of Stored Pollen Supplies on Honey Production

Abstract

Objectives/Goals
My objective is to determine if honey production is effected when certain pollen is stored in hives prior to the honey production period.

Methods/Materials
During the course of this two-year study, I observed 144 beehives. One half (72) of the hives were taken to almond and prune pollination and were able to store pollen and nectar from these crops during February and March. The remaining half (72) of the hives were reserved from almond and prune pollination and were instead kept in foothill locations and fed sugar water. The bees were moved May 5, 2013 and May 7, 2014 to Fallon, Yerington, and Smith Valley, Nevada. Each of these locations received 24 hives from the pollination treatment and 24 hives from the sugar treatment.

Results
In 2013 average honey production was 77 pounds per hive in the pollen treatment and 48 pounds in the sugar treatment. In 2014 average honey production was 75 pounds per hive in the pollen treatment and 50.5 pounds in the sugar treatment. There was a 38% increase in honey production when I took my beehives first to almond and prune pollination; where they could build up pollen first. This pollen is richer in nutrients and has the 10 essential amino acids for brood development.

Conclusions/Discussion
The results of the experiment supported my original hypothesis that pollen availability to beehives prior to the honey production period increased honey yields. Further research will be conducted using drone pheromones to see how well it will work to reduce Varroa Mites naturally so as not to contaminate the honey. I will do a study with the drought to see if the bees will make honey in a drought year.

Summary Statement
I tested if pollen availability prior to honey production would affect honey yields.

Help Received
My mother provided the beehives and transportation for the hives and I to various bee yard locations.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Timothy Lindsey

Project Number
J2208

Project Title
How Do Different Colors Affect a Testudines' Movement through a Maze?

Abstract

Objectives/Goals
The focus of this project was on trying to figure out whether Testudines are able to distinguish colors.

Methods/Materials
To test this hypothesis, a maze was created with different paths but only one path led out of the maze. Then flashlights were used to project the colors red, yellow, green, blue, purple, and orange onto each of the different paths. Next, the Testudines was placed in front of the maze and given 10 minutes to choose a path, this was process was repeated 10 times.

Results
The Testudines was able to distinguish bright colors instead of one specific color.

Conclusions/Discussion
During testing it was observed that the Testudines behaved in an aggressive manner, after research it was discovered that the Tesudines believed I was a predator due to my shadow in the light and so the Testudines' defense instincts became very much apparent. Testudines follow sunlight to get to the ocean once they are born. During that time, predators try to capture them while they are on their way. So the Testudines thought I was a predator trying to snatch it, while it was on its journey.

Summary Statement
Do Testudines have the ability to distinguish colors?

Help Received

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Carolina Medina-Fernandez

Project Number
J2209

Project Title
The Effects of the Specific Gravity of Sea Water on the Vitelline Layer and the Formation of the Fertilization Envelope

Abstract

Objectives/Goals
The purpose of this project is to examine how the specific gravity of the environmental sea water in sea urchin population areas affects their spawning and fertilization. I specifically chose to look at the percentage of fertilization envelope formation as an indicator. This project is important as desalination plants are being proposed along the California coast as part of methods to increase fresh water supplies to coastal populations. These desalination plants may increase the salt concentrations or specific gravity of the sea water locally.

Methods/Materials
Basically what I did was to induce release of the eggs from the urchins into a container with varying specific densities of seawater ranging from my control of 1.025 to 1.125. These were fertilized with the induced sperm under a well slide and the fertilization envelopes observed and counted.

Results
There was minimal interference in the specific gravity range of 1.025 to 1.075, and a dramatic loss of fertilization at a specific gravity 1.100 and 1.125 where virtual no fertilization envelopes were observed. Sperm appeared motile in all cases.

Conclusions/Discussion
My data suggests that as specific gravity of the sea water increases, the percentage of observable fertilization envelopes decrease. This would support my hypothesis that increased salinity would interfere with sea urchin fertilization of the species used. I suspect that the increase in salinity is interfering with the modification of the protein coat that allows the lifting of the vitelline layer, or perhaps the reactions with acrosomal membrane of the sperm.

Summary Statement
This project examines how the specific gravity of sea water in sea urchin populations affects the formation of the fertilization envelope.

Help Received
Teacher supplied sea urchins and materials.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Cassidy J. Mullins

Project Number
J2210

Project Title
Sea Urchin Reaction to UVA and Various Wavelengths of Visible Light

Abstract

Objectives/Goals
I was inspired to visit an aquarium, and there I noticed a surprising pattern in sea urchin behavior. A purple urchin was nestled nearby a purple sea star, a red urchin was beneath a red piece of coral, and a light green urchin was at the base of a long, green piece of seaweed. The urchins looked as if they were attracted to objects of similar color to themselves. Previous research has revealed that urchins can sense white light. I designed an experiment to test whether or not urchins can sense individual colors of visible light as well as UVA light at 385 nm.

Methods/Materials
I purchased ten sea urchins, including; tuxedo urchins, common urchins and pencil urchins. I used patented UVA light at 385 nm that emits no white light and compared these reactions to LED white light responses. I also used narrow range wavelength colored LED lights to test urchin reactions to red, blue, and green light. In another test, I placed a computer monitor behind the tank which displayed colors of warm hues on one half and cool hue colors on the other half. In black and white (grayscale), the two colors would have the same appearance, but in color they would appear very different.

Results
Urchin responses to light, whether negative or positive, varied. Blue tuxedo urchins and common purple urchins appeared attracted to blue light. Common purple urchins were also attracted to green light. Pencil urchins seemed more attracted to red light than to green or blue, but in the monitor test appeared to prefer green light.

Conclusions/Discussion
It was difficult to conclude whether the urchins reacted to the individual colors of light or simply to the light stimulus. According to my results, all three species of sea urchins responded to the presence of red, green, and blue wavelengths of light, and also to UVA light at 385 nm. I would recommend further testing to confirm these intriguing findings.

Summary Statement
I designed an experiment to test sea urchin responses to various frequencies of visible light and UVA light at 385 nm.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Cherrie Mae C. Paghasian

Project Number

J2211

Project Title

How Do Rising Sea Levels of Tides Affect the Population of Emerita analoga?

Abstract

Objectives/Goals

Sand crabs are very important to the world, such as medical research because of their sensory neurons. This is also because sand crabs carry many parasites such as Acanthocephala, or thorny headed worms which causes the deaths of surf scooters and sea otters. Sand crabs also consume domoic acid and DDT. By having this, it could lead to death of the predators of the sand crab and possibly to humans, especially if digested. This is why this science fair project aims to show that rising tides will either increase or decrease the population of the sand crab. The hypothesis was that sand crabs would appear during the highest tides, 5 to 6 feet with an average of 15 sand crabs per sample.

Methods/Materials

The survey line was used to measure every one meter mark to place stake flags at. The stake flags were used to mark where to dig up the sand crabs with the core. The core was used to dig up sand crabs from sand. The two plastic sieves were used to place the sand from the core. The three plastic calipers were used to measure the length of each sand crab.

Results

The highest tide was 5.71 feet. The second highest tide was 4.21 feet. The lowest tide was -0.46. For this tide, measured 5.71 feet had an average of 21.4 sand crabs per sample. The second highest tide measured 4.21 feet. This tide had an average of 16 sand crabs per sample. The third highest tide was -0.41 feet. This tide had an average 14.4 sand crabs per sample. The fourth highest tide was -0.42. This tide had an average of 8.4 sand crabs per sample. The lowest tide was -0.46 feet. This tide had an average of 11.2 sand crabs per sample.

Conclusions/Discussion

The data gathered showed that the hypothesis was correct. Most sand crabs appear during the highest tides, 5 to 6 feet. With the data, the highest tide was 5.71 feet high with 107 sand crabs. The lowest tide was -0.42 low tides with 25 sand crabs. This would mean that the higher the tide, the more sand crabs would appear. The lower the tide is, the fewer sand crabs will appear. More crabs will appear during high tide because as the tide becomes more turbulent, plankton will appear for the sand crabs to eat.

Summary Statement

My project is about figuring out if rising sea levels affect the population of sand crabs by sand crab monitoring and figured out that the higher the tide, the population of sand crabs will increase.

Help Received

Family and friends helped to sand crab monitor and to write down data onto log sheets. Used sand crab monitoring equipment and log sheet from LiMPETS program.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

Moshe M.P. Parnas

Project Number

J2212

Project Title

Effect of Reversing Magnetic Fields on Darkling Beetle Larvae

Abstract

Objectives/Goals

Earth#s magnetic field has periodically reversed polarity, some believe that it has begun a process of slowly reversing. Since this isn#t in recorded history,it is unknown what effect pole reversals will have on living organisms,especially those that use the Earth#s magnetic field for migration.The project#s purpose is to determine if reversing magnetic fields will have an effect on the activity of mealworms.

Methods/Materials

20 Mid-sized mealworms were placed into each of 2 small aquariums with 1 inch of bran flakes for bedding. A transparent 1-inch grid was placed on the bottom of 2 tanks,aligned so the center of the grid marked the equator between 2 reversible and opposing magnetic fields of strong bar magnets. Slices of apple were placed in the center for moisture.The magnetic poles in tank 1 were reversed every 2 weeks for 4 weeks.The control tank#s magnets were not reversed throughout the test.The locations of the larvae were recorded every 3-4 days. As an alternate control,a tank with no magnets inside was observed and recorded. Procedures were repeated 4 times, each with new mealworms.

Results

Although 19.5 % of the larvae were not visible at recording times,after 6 reversals of the magnetic fields, of the larvae that were visible, 56% preferred to be located near the south pole, while 44% were located north of the center line. The control that had no magnets and was aligned with the Earth#s magnetic field, 55% of the visible larvae were located near the south magnetic pole throughout the test. In the control group that had magnets throughout the test, 60% of the visible larvae preferred to locate themselves near the south magnetic pole.

Conclusions/Discussion

Overall,15% more of the visible mealworms located near a south magnetic pole, 60% of the visible mealworms in the control with non-reversing magnetic poles were found located near the south magnetic pole.The control without magnets showed that the mealworms preferred to be in the middle right under the apple through a slight preference for the Earth#s south magnetic field. Every time the poles were reversed the mealworms slowly migrated to the south,in spite of the apples being in the center.In every case more larvae preferred to be located near the south magnetic pole throughout the tests.When Earth#s magnetic field has fully reversed, the results suggest that the mealworms might have difficulty navigating to sources of food and moisture.

Summary Statement

To determine whether a reversed magnetic field has an effect on darkling beetle larvae,the larvae were placed into a container with opposing magnetic fields that were reversed every two weeks as their movements were recorded.

Help Received

My parents for providing me with all the supplies needed for this project,my science teacher, Mr.Schuyler for inspiring me to like science and for his great ideas for this project,Chabad Hebrew Academy for providing my entrance fee,Mrs.Stanley for teaching me about statistical analysis,Mrs.Sniffen for the

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Jessica A. Pate

Project Number
J2213

Project Title
Monitoring the Flight Patterns of Local White-Faced Ibis

Abstract

Objectives/Goals
On the way to school one morning, and I saw a group of unusual looking birds flying overhead. They had a large wingspan, and an odd shaped beak. I told my science teacher about it, and she said they were probably a migratory species of water bird called the White-faced Ibis. Soon afterward, I saw more groups of these birds flying in the same general direction, around the same time. I decided to document my findings. I wondered if the birds would be consistent in their flight patterns, or would their activity be unpredictable. I hypothesized that the number of Ibis I observed might vary significantly, and their direction of travel might differ. I also believed that the Ibis might appear at the same general time, but that the weather conditions might impact their flight patterns.

Methods/Materials
I recorded the date, time, location the birds were observed, number of flocks, number of birds per flock, number of birds, their flight direction, weather conditions, temperature (°C/°F) and humidity levels. During the time I was documenting my observations I did some additional fieldwork. I visited lakes in search of where the Ibis may have been drawn to each day, and did some additional research on where the Ibis had recently been seen. The lakes I visited included Guajome Lake, Buena Vista Lagoon, Libby Lake, and Whelan Lake. I met various #birders# who were involved with the lagoons or lakes, and I found lots of evidence of where the Ibis might reside.

Results
On days that I observed the White-faced Ibis, an average of 49 birds were seen daily, however I observed many more on some days, even as many as 120 one morning. For those days, the average number of birds per flock observed was 16. Finally, the most frequently recurring numbers of birds seen on the observation days were 20, 30, 45, and 60 White Faced Ibis.

Conclusions/Discussion
Through my observations, I discovered that they Ibis seemed to fly in only one direction in the morning, (east), and fly west in the evening, flying back to where they reside during the nighttime. The evidence I collected supported the theory that the Ibis are probably flying to Pala Lake from Whelan Lake. Also, they are using the San Luis Rey Riverbed as a guide to lead them to Pala. Weather did not appear to make a difference in their flight patterns.

Summary Statement
I wondered if the White-Faced Ibis that I saw near my home would be consistent in their flight patterns, or if their activity would be unpredictable and I discovered that there was a significant pattern.

Help Received
My mom drove me to various lakes to observe birds; my science teacher let me borrow various of scientific equipment for the observation process; the caretaker of Whelan Lake allowed me to observe on private grounds; a member of the Buena Vista Audubon Society told me about her observations.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Angelina J. Taylor

Project Number
J2214

Project Title
Planarian Regeneration

Abstract

Objectives/Goals
For this year#s science fair project I chose to investigate if after being cut in half will the top half or bottom half of a planarian worm regenerate faster. The reason I chose this topic is because we have been learning about flatworms in science class and I found it fascinating that planarian worms regenerate. The top and bottom half may grow back at different speeds and I hope that through this project I can find out which half will regenerate faster.

Methods/Materials
Take 6 planarian worms and cut them in half crosswise. Put each of the halves in their own labeled petri dishes. Put the petri dishes in the refrigerator. Take the petri dishes out each day and measure the planarian worms and change the water. Return the petri dished to the refrigerator.

Results
Two of the head portions died early on in the experiment. Starting on day 5, I noticed the cut portion of the bottom began to round out inward toward the body. On day 13 a head began to grow from the cut portion. On the growth chart for the top and bottom portion you will see that the top portion achieved 8mm on day 9 while the bottom half did not reach 8mm on average until day 13.

Conclusions/Discussion
My hypothesis that the top potion would grow back faster was correct based on my 14 days of measurement. The top portion grew to 8mm in only 9 days, while the bottom portion took 13 days to reach 8mm. However, my hypothesis was also partially incorrect in that the bottom portion regrew the head faster than the top portion regrew that tail. I noted that the bottom portion showed signed of head regrowth starting at day 5 and fully showing at day 13. When I concluded the experiment on day 14, the top portion still had not shown signs of re-growing a tail.

If I would take this experiment farther, I would use more worms and measure it for a longer period of time. This experiment can be useful in the real world by gaining a better understanding of the regenerative process and doctors might find ways to heal people better.

Summary Statement
After a Planarian Worm is cut in half, will the Top Half, containing the brain, or the Bottom Half, containing the tail, regenerate faster?

Help Received
I received guidelines for the project from my teacher and my dad bought materials.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Saida M. Woolf

Project Number
J2215

Project Title
The Quest for the Easy Peeling Egg

Abstract

Objectives/Goals
The purpose of my experiment was to determine how the age of an egg affects how well it peels. My hypothesis is: the older the egg, the easier it will peel.

Methods/Materials
I used the following materials: 3 dozen eggs, pot, water, litmus paper and stovetop.
My procedure is as follows:
1. (Phase I) Buy a carton of 12 eggs and record the Julian date.
2. Boil 4 of the eggs right away (see recipe for boiling eggs).
3. Peel them after they cool and record how hard they were to peel.
4. Repeat at 7 days and 14 days.
5. (Phases 2 & 3) Buy two dozen farm fresh egg.s
6. Refrigerate one dozen (phase 2) and leave other dozen on the counter (phase 3).
7. Crack one egg from each carton and measure their ph using litmus paper.
8. Boil 3 eggs from each carton.
9. Peel them after they cool and record how hard they were to peel.
10. Repeat when each carton is 7 and 14 days old.

Results
My results showed that the unrefrigerated eggs peeled the best and the refrigerated eggs slowly got easier and easier to peel.

Conclusions/Discussion
My conclusions were that my hypothesis was correct. A future experiment could be to do the same thing as phase 2, but add baking soda to the pot while the eggs are boiling.

Summary Statement
My experiment determined how the age of a hard boiled egg affects how well it peels.

Help Received
My dad helped me boil the eggs.

CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Xi-Kai I. Wu

Project Number
J2216

Project Title
Memory Duration of Natural Memetics for Tetras in Reintroduction

Abstract

Objectives/Goals
The goal and objective of the experiment is to figure out the duration of memory for natural memetics (e.g. learned information) in three species of captive Tetras, including the Flame, Neon, and Ember Tetras, and what factors affect it.
The hypothesis was that in the maze with no cues, the average time will be 1 minute and 40 seconds for each fish. At the last test period after two weeks, the average time will be 1 minute and 20 seconds for each fish. In the maze with cues, the average time will be 1 minute and 10 seconds for each fish. At the last test period after two weeks, the average time will be 50 seconds for each fish.

Methods/Materials
2 mazes need to be constructed out of two 16 (L) by 7.5 (W) by 1/2 (H) inch pieces of Styrofoam and a 280 (L) by 2 (W) by 1/2 (H) inch piece Styrofoam, one with color and one without with 20 of each type of fish, Ember, Neon, and Flame Tetras. 10 fish from each species are put into each maze on control day, 1 day after, 2 days after, 1 week, and 2 weeks after the previous tests. While they are in their designated maze, record time, amount of mistakes, and stops.

Results
The Neon Tetras went from a time of 91 seconds, down to 69 seconds in the visual cues maze, while they scored 93 seconds, and ended at 106 seconds in the no visual cues maze. The Flame Tetras went from 87 to 68 seconds in the visual cues maze, while they scored 156 down to 57 seconds in the no visual cues maze. The Ember Tetras went from 24 seconds in the beginning and went down to 20 seconds in the visual cues maze, while they scored 121 to 135 seconds in the no visual cues maze.

Conclusions/Discussion
The data showed very different results than the hypothesis. The duration of natural memetics in species of Tetras is around 3 weeks to 1 month. Around 2 days, each species started to increase in all three, time, amount of mistakes, and amount of stops. Color had an effect on the duration of how well the simulated migration route was memorized by stimulating the past experiences. Different species natural tendencies and lifespan also affected the memory. The tetras all had a wide variety of scores, ranging from 93 to 24 seconds in the visual cues maze, showing each tetra have very different memory ranges and skills.

Summary Statement
This project is about the period of time before a Tetra would forget something they have learned.

Help Received
Grandparents bought fish; Dad helped construct maze; Parents helped throughout testing.