Project ID: 501

JR - Animal Sciences

Gavin Shaw
Grade 7
St. Gregory the Great Catholic School
Advisor: Sudipta Dasgupta

Ants Favorite Food and Natural Repellent

Ants have been home invaders for a long time. Some people kill the ants but I think there should be better and kinder way to deal with this problem. I wanted find a natural ant repellent to get rid of ants and not kill them. Hypothesis: if I put vinegar on the ant's favorite food, jello, then ants will stay away from it. Procedure: I first make a bracket of all the food I think the ants would like. Then I put 2 little amounts of food the same distance away from the entrance, then I wait 3 hours and count how many on each. I repeat this until I reach a conclusion, then I repeat that step until I complete the bracket and the one at the end is their favorite food. I repeated this process with adding a natural repellent.

Results: The honey with sugar by far was the ant's favorite food. Honey with sugar had an average of 5.25 ants, honey by itself had an average of 4.5 ants on it. As a repellent, vinegar sometimes zero ants on it. The vinegar had an average of 0.5 any on it while sugar honey alone had an average of 5.4 ants.

Conclusion: My hypothesis was partly refuted and partly supported. The jello was not the ant's favorite food, but honey sprinkled with sugar was. The vinegar was proven to be the best repellent. The western harvester ant's favorite food is honey with some sugar in it. The best repellent is vinegar mixed 50/50 with water. The vinegar had kept the ants away for a few hours. The vinegar had 1 ant on it once and 0 the other tests showed it was the best. As soon as I sprayed vinegar on the honey with sugar, ants did not come out of their tunnels to eat. I think vinegar is an excellent substitute to the toxic chemicals in the commercial ant repellent.

Project ID: 502

JR - Animal Sciences

Mackenzie Franey
Grade 7
St. Michael's School – Poway
Advisor: Kathryn de Venecia

Finding the Most Productive Size Flock for Backyard Chicken Owners

During the COVID-19 pandemic, people started raising backyard chickens because they didn't want to have to go to stores to buy eggs and the price of eggs went up due to supply chain issues. One issue people face who want backyard chickens is they don't know how many chickens to buy to ensure they have enough eggs to eat. This experiment focused on figuring out the optimal number of chickens needed to produce enough eggs. The hypothesis was if the number of chickens in a coop increased, the amount of eggs laid per chicken would increase, because chickens are social animals who are healthier in a larger flock. To test this hypothesis, 14 chickens were placed in a control group that would stay together in their normal coop for two weeks and egg counts were conducted daily. Then the 14 chickens were split up into four groups of two, three, four, and five chickens living in different small coops for the experiment. The findings were not what was expected based on the hypothesis. The group size did not matter as all experimental groups showed a significant drop in egg production (51 eggs during control and 11 eggs during experiment). These results showed the size of the group was not most important, but rather the separation from the original large flock and the move into new coops lowered egg production. This study suggests flock size does not matter, but rather the environment and comfort is most important for egg production.

Project ID: 503

JR - Animal Sciences

Patrick Louie
Grade 8
Farb Middle School
Advisor: Patricia Huntington

What Attracts Fruit Flies?

Flies consider things that give off the scent of sugar or ammonia as food. Flies smell using their antenna which are dense in hair-like structures that contain olfactory sensory nerve cells. These cells are very sensitive to volatile chemicals, which are often called odors. In my experiment, I set up bowls of substances that attracted fruit flies inside a cage. I then counted how many flies landed on each bowl for 12 trials. My control group was the standard fly bait, apple cider vinegar, and my test groups were nonstandard fly attractants, like raspberries, juice, peanut butter, etc. The largest number of flies recorded was on the orange juice on the twelfth recording of data at 160 counted flies. The average of the orange juice being 42.66. My experimental group at its highest only reached 14 flies recorded, with an average of 7. This may be due to the increased pungency of the orange juice, after a night left unrefrigerated.

Project ID: 504

JR - Animal Sciences

Anabia Ehsan
Grade 6
Bright Horizons Academy
Advisor: Najwan Naserelddin

Impact of Vitamins on Planaria Regeneration: A Model for Regenerative Medicine

A starfish loses its arm, a lizard loses its tail, within a year they regenerate fully. Imagine if you could drop an entire limb and have it grow back? It would be a nifty trick. Well, one worm can do so: Dugesia dorotocephala, (Planaria). This amazing creature can regrow any part of its body using specialized cells. What if with the aid of natural supplements, the regeneration could be achieved at an optimal rate. Can Vitamin A accelerate regeneration of planaria's segments? The aim of this study was to observe potential effect of Vitamin A, B7 and B12 on regeneration rate of different segments of bisected planaria.

For experimentation, 108 Dugesia dorotocephala were obtained. 3 trials were done simultaneously. Bisecting them either lateral, transverse, or decapitated and treated with Vitamin A/ B7/ B12 or untreated and observed over period of 3 weeks, noting the rate of regeneration.

All planaria survived. Difference in average regeneration rate was observed with each group.

Control-Spring water: 11.3-11.3-11.3
Vitamin A: 11.3-10-10
Vitamin B7: 9-9-8.3
Vitamin B12: 9.7-10.3-9.7

Average growth increase of 3 trials:

Control-Spring water: 52.92%
Vitamin A: 48.68%
Vitamin B7: 41.75%
Vitamin B12: 43.92%

As observed by this investigation, the hypothesis is rejected. Vitamin A did not increase the regeneration rates of bisected planaria, instead Vitamin B7 did.

In last 10-15 years, stem cell-based regenerative medicine has raised hopes for individuals with amputation of limbs. This study might help the researchers in identifying the effect of supplemental aids on stem cells for regeneration.

Project ID: 505

JR - Animal Sciences

Mariam Jafari
Grade 8
The Cambridge School High School
Advisor: Melissa Mayne

How to Determine an Animal's Status of Predator or Prey Using Its Nose to Eye Angle

I measured the nose to eye angles in mammals in order to see if there was a distance difference that could be used for classification of predator and prey. Before beginning my comparison, I hypothesized that predators would have a nose to eye angle of below eighty while the prey would have a nose to eye angle of above eighty. I thought this as, form the first look at the mammals I saw that there was a difference in the angles.

I began with gathering pictures of of 28 different mammals, 14 of each predator and prey. I discovered that typically the prey has a wider interocular distance compared to the predators. I then began the task of using an online protractor to measure the nose to eye angle of each of mammal. As I recorded this dats, I organized these mammals by their previous classification of predator or prey, which helped me see the accuracy of my hypothesis at a glance.

My hypothesis was rejected by the data I collected, as the predators had an average nose to eye angle of 56.5º and the prey had an average of 67.4º. In order to see if there was a statistical difference between these results I inputted my data into error bars.The Standard Deviation of the predators was 10.4 and of the prey it was 18.7. The SEM of the predators is 2.8 and the SEM of the prey is 5.. In the graph the error bars had overlap proving that the results were not statistically different. In order to expand this project further, I suggest that other aspects could be taken into consideration, such as interocular distance, face length, placement of facial features, and the overall size of the mammal

Project ID: 509

JR - Animal Sciences

West Tinnerstet
Grade 8
Coastal Academy
Advisor: Bridget Biernacki

What's That Glow: Does Changing Dinoflagellates Light Cycles Affect Them?

Dinoflagellate blooms are very common to see in California and these gave me a great idea for my science fair project. I decided to measure the amount of light dinoflagellates produce when exposed to different amounts of light. My project question is what amount of light exposed to dinoflagellates will in turn produce the most amount of light (twenty-four hours, zero hours, four hours, and twelve hours). I hypothesized that the batch exposed to the twelve hours will produce the most light.

My independent variable used in the experiment was the amount of light exposed. The dependent variable was the amount of light produced and I measured this light with my phone using an app. I measured the amount of light using foot-candles and lux which are both common ways to measure light. I tried to control the amount of light exposed to the dinoflagellates as best as I could. I measured each container in a dark room for over two weeks to get a good average of all the data. To do this I put each jar in dark containers so outside light wouldn’t get inside. Inside each container, there was an LED light bulb on a timer so that I wouldn't have to manually activate it.

The results I gained from this experiment supported my hypothesis. To produce the most amount of light, dinoflagellates have to have a moderation of light and darkness.

Project ID: 510

JR - Animal Sciences

Isabella Barroso
Grade 7
Nativity School
Advisor: Lindsey McTavish

The Circadian Rhythm Of Bioluminescence In Dinoflagellates

Dinoflagellates are unicellular algae that exhibit a spectacular bioluminescence phenomenon during the dark hours, which has long been speculated to be regulated by an internal biological clock.

To test this hypothesis, we conducted an experiment to investigate whether the bioluminescence of dinoflagellates is influenced by external light or an internal timekeeping mechanism. We monitored the bioluminescence intensity of dinoflagellates under strictly controlled conditions in a chamber for six days.

During the first five days of the experiment, the dinoflagellates were exposed to a 12-hour light/12-hour dark cycle, while on the sixth day, the chamber was kept completely dark for 24 hours. The first four days of the experiment were used for acclimating the dinoflagellates. Throughout the experiment, we recorded the light intensity and temperature in the chamber and measured the bioluminescence intensity and water pH during days five and six.

Our results demonstrated that the dinoflagellates displayed the same bioluminescence pattern on day six as on day five, even though the chamber was kept dark throughout the 24 hour period. The pH and temperature measurements remained consistent between the two days. These findings suggest that the bioluminescence intensity of dinoflagellates is not solely dependent on external lighting conditions but is partially influenced by an internal timekeeping mechanism. In conclusion, our experiment provides evidence to support our hypothesis that dinoflagellates have an internal biological clock that regulates their bioluminescence pattern. Further studies using different batches of dinoflagellates will provide more insights into the regulation of circadian rhythms in these organisms.

Project ID: 511

JR - Animal Sciences

Nosson Breskin
Grade 8
San Diego Hebrew Day School
Advisor: Stephen Jones

Natural Vs Processed: Which is Better

Which fish food causes less harmful chemical compounds in home aquariums? This project examined which of two fish foods will cause less ammonia and nitrates in a fish tank. It is hypothesized that bloodworms will be better by causing less nitrates and ammonia because they are natural. The procedure for doing this testing is to set up two identical fish tanks with 3 goldfish in each tank. Tank A will be fed bloodworms while tank B will be fed fish flakes. Test both tanks twice a day once at 7:00 am and once at 7:00 pm. Feed fish at 7:15 am every day and after 10 days of testing, see which tank had a lower average ammonia and nitrate. The final testing results for both ammonia and nitrates for bloodworms were 0.44ppm for ammonia and 26.58ppm for nitrates. The final ammonia reading for flakes was 0.41ppm and for nitrates was 21.75ppm. The flakes proved to result in lower amounts for both ammonia and nitrates. Because of this, the original hypothesis was not supported by the data. This may have happened because bloodworms are all natural with no added ingredients while fish flakes are manufactured by companies who were able to add beneficial protein and bacterias into the food that are better for the fish.

Project ID: 512

JR - Animal Sciences

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Mia Evans
Grade 8
Mt. Helix Academy
Advisor: Kayla MacDonald

Which Food Will Red Worms Consume the Quickest?

This project examined the effect of feeding red wiggler composting worms 10 grams of different types of organic matter to determine which one would be consumed in the fewest number of days. My hypothesis was that the cucumber would be eaten by the worms in the shortest amount of time. I made three worm farms, each with a consistent weight of worms and substrate. I then performed three trials for each of the worm farms (buckets); I put cooked brown rice in bucket 1, used coffee grounds in bucket 2, and sliced cucumber in bucket 3. Results indicated that the hypothesis was supported, as the red wiggler composting worms consumed the cucumber the quickest. The worms finished the brown rice in an average of 13.7 days, they finished the coffee grounds in an average of 7.3 days, and they finished the cucumber in an average of 3.3 days. Based on the results, I suspect that the cucumber was finished in the fewest number of days because cucumber is made up of a very high percentage of water (96%), and this may have contributed to the results because worms seek out water. Additionally, the water that makes up the cucumber may have evaporated or soaked into the substrate, leaving less matter for the worms to feed on.

Project ID: 513

JR - Animal Sciences

Gabriel Myers
Grade 8
San Diego Hebrew Day School
Advisor: Stephen Jones

Which Sock Will the Dog Sniff Longer?

The goal of this project is to see which sock a dog will smell for longer, their owner's clean or dirty sock, or a stranger's clean or dirty sock? It is hypothesized that a dog will stay longer at the non-owner's sock than the owner's sock. The dogs were tested to see if they would recognize the scent through a sock. The test took place at the owner of the dog's house. Results indicated that the hypothesis was incorrect. The hypothesis was that if a dog will stay longer at the non-owner's sock than the owner's sock. As it shows in my graphs the dogs stayed longer at the strangers' dirty sock. The average time spent at each zone for the strangers dirty sock was an average time of 3.62 seconds. The average for the total number of visits for the strangers sock was 11 total visits. For the total number of visits graph it shows that the dogs went in order of which the socks were placed.

Project ID: 514

JR - Animal Sciences

Ella Kang

Luciana Balderrabano

Grade 8

Stella Maris Academy

Advisor: Sara Eckmann

What Food Makes a Painted Lady Butterfly Grow the Fastest?

This project examined the effect of painted ladies' change of being grown while giving only one type of food to each butterfly. Our goal was to know which food will make a painted lady caterpillar grow fastest through the experiment. The food we planned to give to the caterpillars are sunflower, fruits, apple, and black eyed flower. It is hypothesized that the caterpillars that ate the sunflower will grow faster than the others that ate other foods, such as fruits or other flowers. We hypothesized that, because we expected the sunflower had more vitamin nutrients than other flowers. For a caterpillar to be a butterfly, the amount of nutrients in the food affects their speed of growing because nutrients are the substance that make them grow. Results indicated that the hypothesis was not supported. The caterpillar which has eaten the black eyed flower hatched the fastest and the two caterpillars which has eaten the fruits and the apple reflectively, hatched next from the chrysalis. The caterpillar which ate the sunflower hatched the latest, which was unexpected. Although there was one dead caterpillar during the experiment, the others all hatched healthy from the chrysalis and became a butterfly by eating the food which we planned and gave it to them. All of the surviving butterflies have been setted free after finishing the record of experiment.

Project ID: 515

JR - Animal Sciences

Aya Ajanovic
Grade 7
Bright Horizons Academy
Advisor: Najwan Naserelddin

Red-40 Affect on Daphnia

The purpose of this project is to investigate if Red-40 will have an effects on the daphnia's heart rate and viability after exposure to different concentration of the dye. It is hypothesized that Red-40 will increase the heart rate on the daphnia while the viability will decrease.
The first step was to obtain the Daphnia from Carolina.com. One Daphnia was then placed in well 1 and its heart rate was measured for one minute under the microscope. A solution was created by mixing 10 ml of Red 40 dye with 40 ml of dechlorinated water. 10 ml of this solution was then added to well 2. The Daphnia from well 1 was then transferred to well 2 and its behavior was observed for 3 minutes. Its heart rate was measured for another minute under the microscope. The Daphnia was left in the solution for 10 minutes before being transferred to a test tube labeled "Low Concentration Exposure." This process was repeated 10 times and the heart rate before and after exposure to the dye was recorded. In a similar manner, the experiment was repeated, but this time with 20 ml of Red 40 dye in step 3. The Daphnia was transferred to a test tube labeled "High Concentration Exposure." The viability of the Daphnia in each test tube was evaluated at 24 hours by checking for normal swimming behavior. The heart rate and viability of the Daphnia in the control group was compared to those exposed to the dye solution. The data was analyzed to determine if there was a significant difference between the three groups and identify the concentration of the dye solution that resulted in the most significant change in heart rate and viability. It was important to ensure that the conditions were consistent across all test tubes.
In conclusion, the results of this experiment showed that as the concentration of Red 40 dye increases, there is a corresponding decrease in both heart rate and viability. These findings suggest a negative impact of Red 40 dye on cardiovascular function and overall health, providing valuable insight into the potential dangers of food dyes and the importance of monitoring their use in consumer products. Further research is needed to fully understand the mechanism behind this relationship and to determine the safe limits of Red 40 dye consumption.