

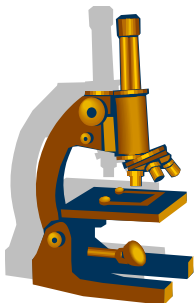
Marine Academy of Technology & Environmental Science



Eighth **Research Showcase**

Abstract Guide

April 7, 2014



April 7, 2014

It is our eighth year of the MATES Research Expo! This was a great year for student research outside of MATES with 19 projects presented at the Delaware Valley Science Fair and four papers presented at the Rutgers Junior Science and Humanities Symposium and Monmouth Junior Science Symposium. All freshmen and transfer students were required to conduct an independent experiment. Once completed, the students completed a poster culminating in the poster session on April 7, 2014. Many hours went into the projects as the first year MATES students will be presenting their posters. All posters will be displayed in alphabetical order of their last names in separate categories. They will also be judged based on their category.

We would like to thank the students for their project presentations this year. The students worked hard and it will show in the following abstracts, and during the poster session. Thanks to the MATES Parent-Teacher-Student Organization that was generous in providing funds for materials for numerous projects. We wish to thank our Ocean County Vocational Technical School Board of Education, Administration (Mr. Hoey, Ms. Weber-Loeffert, Mr. Frazee, and Ms. Carroll) and MATES Staff, especially Mr. Jason Kelsey and Mr. David Werner (both advisors), Mr. Michael Bixler, Ms. Maryann Minnier, Ms. Mia Dill, Mrs. Kelly Kelsey, Mr. Adam Sprague (advisor), Mr. Gary MacDonald, and Mr. Brian Coen who contributed to the success of the project. Also, thanks to Ms. Robyn Chiariello, Ms. Esther Gallacchio, and our wonderful maintenance staff for all of their support and assistance.

Thanks to the parents who have contributed much time and effort in making the projects possible. Without their support, this research would not be possible. I would like to take this time to thank Sarah Jakositz, Meaghan Martin and Leah Goldsberry (class of 2014) for organizing research mentoring sessions for the freshmen. And, last, but not least, a very special thank you to all of our judges who volunteer to provide our students with constructive feedback about their projects. We greatly appreciate your time and expertise in making the 2014 MATES Research Expo a real success.

Congratulations to all of the students listed in this guide.

Sincerely,



John Wnek, supervisor,
Science and Research

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AQUATIC AND MARINE ENVIRONMENTS

101. DO COPPER-BASED ANTIFOULING PAINTS RELEASE COPPER INTO WATER?

Dawson Brown, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Dr. John Wnek

Copper-based antifouling paints are used on the hulls of boats all over the world. Copper is so widely used due to the benefits of preventing marine growth on boat-bottoms, but it is also harmful. This study was completed to analyze how the copper used in antifouling paints releases into bay water. After collecting water from the Barnegat Bay, samples were placed in a tank with a jet pump to keep water flowing. Samples were taken every five days for a period of forty days. After each sample was taken, the water was replaced with a standing pool collected at the same time as the original sample to keep the water level constant. The results indicate that copper is released increasingly into the water over time, but not at a constant rate.

102. DOES SOIL TYPE AFFECT THE GROWTH OF SALTWATER-DAMAGED PLANTS?

Julia Conway, Block 2 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Many parts of the Jersey Shore were flooded with brackish and ocean water during Hurricane Sandy, leaving crops damaged. All crops vary in salt tolerance levels, but could a partial source of the damage be the type of soil that a plant is in? To find this, “The effects of Sodium Chloride (NaCl) Solution of the Growth of Plants” from the Portland Community College was done to assess the relationship between the type of soil and reaction to saltwater flooding. Four different plants were given a sodium chloride solution with an 11.5% concentration and growth was measured over the course of 3 weeks. The experiment concluded that rich and sandy soils respond slightly better than clay-based soils. This shows that there is a relationship between the types of soil a plant is in and how it copes with saltwater inundation.

103. THE NITROGEN ABSORPTION OF AQUATIC PLANTS

Kai Ongaro, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Dave Werner

The purpose of this study was to understand the nitrogen consumption of plants over a certain period of time. To do this, three different types of plants were tested water wisteria (*Hygrophila difformis*), frogbit (*Hydrocharis morsus-ranae*), and pennywort (*Centella asiatica*). Two of each plant was obtained and put into the same conditions (same sunlight, nitrogen enriched water, container) along with a control contain with the same levels of nitrogen enriched water. These subjects were tested over a period of five days. The results from the experiment were very steady. Over the 5 test days, the nitrogen levels (in parts/million) almost all decreased to a value of 1 ppm. The information gathered was not as accurate as it could have been. Factors such as evaporation and accurate measuring tools were present in this lab. In the future, studies such as this can benefit the aquatic and terrestrial environments alike. Nitrogen levels in certain environments can affect the whole ecosystem. Knowledge on how to rid these areas of an excess, can be a great benefit.

AQUATIC AND MARINE ENVIRONMENTS (CONTINUED)

104. WHICH ALGAE SPECIES GROWS BEST IN A CONCENTRATED CARBON DIOXIDE ENVIRONMENT?

Sean Sia, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

Because automobile combustion is one of the leading causes for excess amounts of carbon dioxide in the environment, what if algae were implemented to take in the carbon dioxide from the combustion? Algae can produce oxygen and it could also be used as a biofuel to decrease the amount of fossil fuels used. This experiment was conducted to identify the algae species that best grows in a concentrated carbon dioxide environment. There were four species of algae (*Chlorella*, *Peridinium*, *Gloeocapsa*, and *Oscillatoria*) that were observed every week throughout the month of December 2013. CO₂ was produced by mixing the base, baking soda, with the acid, vinegar. Using a microscope, after equally distributing the species throughout its container with the stirs, the estimated amount of algae in the bottle was determined by counting the number of cells per slide (density of algae). Growth rates of algae were compared between the concentrated CO₂ and the ambient air. *Chlorella* had the best ratios over the course of the experiment, and resulted with the least problems. Thus, it would be more efficient in the uptake of CO₂ combustion for the next experiment with automobile combustion.

105. WHAT EFFECT DOES THE DRAINING OF THE LAKES AT LACEY, NJ HAVE ON NITRATE LEVELS?

Kaitlyn Triano, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

During the winter, the lakes in Lacey Township, New Jersey are drained as a means to reduce algal growth in the spring. One of the problems associated with the lakes is high nutrient counts. Nitrates are nutrients that originate from animal waste, pollution, and fertilizer. Sometimes, nitrates from atmosphere deposition make up 40% of the nitrates that are affecting the environment. Too many nitrates in the water are indicators for poor water quality and this water can now affect the environment in negative ways. This study was conducted to determine the effect of draining the lakes on nitrate levels over time. After taking ten sets of samples from each of the four lakes and testing them for nitrates, it was concluded that after the drainage, the nitrates became more concentrated in the water, which initially increased the nitrate levels. However, after the last four weeks of testing, it seemed that some of the nitrate levels began to decrease. A key to removing excess nitrates is reduction and a process called denitrification. By draining the lakes, the bottom sediment becomes exposed to more aerobic conditions which affect the conversion of nitrates to nitrogen. Therefore, there must be a better solution than draining the lakes to reduce algae. This conclusion supports the hypothesis that the drainage of the lakes creates environmental issues and poor water quality. To fix this problem, the town must stop the drainage of the lakes in the winter and leave them in their natural state.

AQUATIC AND MARINE ENVIRONMENTS (CONTINUED)

106. TURBIDITY REDUCTION USING THREE DIFFERENT FLOCCULATION METHODS

Laura Tsang, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey, Dr. John Wnek

Turbid water is dangerous to animals, plants, and ultimately, humans. Eliminating turbidity usually requires a costly and involved process as it is filtered through a water purification plant. By simply adding a flocculation agent to turbid water, the contaminants can easily be filtered out leaving pure water behind. The seeds of the *Moringa oleifera* tree, mucilage from the *Opuntia ficus-indica* cactus pad, and aluminum sulfate were used in this study as flocculation agents. The effectiveness of the three different agents was compared by using a turbidity meter to find the turbidities of the treated water samples. The resulting turbidities were greater than the initial turbidities. It is theorized that the flocculating agents may have added to the turbidity while removing the initial cause for turbidity. Since *Moringa oleifera* seeds and *Opuntia ficus-indica* mucilage are edible and nutritious, the added turbidity resulting from using them as flocculating agents may not be harmful in any way; while the resulting turbidity from aluminum sulfate may have adverse health effects.

107. DOES DEBRIS WASHED INTO THE BARNEGAT BAY FROM SUPERSTORM SANDY HAVE AN EFFECT ON THE pH?

Brendan Tumpey, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Dr. John Wnek

Barnegat Bay is a very delicate home to many plants and animals. However, this fragile balance was interrupted when Superstorm Sandy brought devastation to the East Coast, leaving an unprecedented amount of debris in Barnegat Bay. All of this debris could have a serious effect on the pH, or acidity, of the water, which would harm much of the life in the bay. In this experiment, four different metal samples, along with one sample of PVC, were placed in six different containers containing water from Barnegat Bay. Once a week for eight weeks, the pH of these water samples were measured and recorded. By the eighth week, the results show that the two samples that seemed to have the greatest affect were iron and steel. The pH levels of these two samples in week one were 7.21 for iron and 7.18 for steel. However, by week eight, the pH levels for both iron and steel were 6.78. This suggests that these metals did in fact make the water more acidic. All the samples seemed to follow a pattern, which means there may be another factor, such as weather/temperature, could have an effect on the pH of water.

BACTERIOLOGICAL AND MICROBIOLOGY:

201. IS PITAVASTATIN INCLUDED IN THE ANTI-MICROBIAL AFFECTS THAT STATINS HAVE BEEN KNOWN TO EXHIBIT?

Sarah Berger, Block 3 Science Class, Marine Academy of Technology and Environmental Sciences (MATES),
Advisors: Mr. Jason Kelsey and Dr. John Wnek

Statins are a class of lipid-lowering drugs prescribed to treat high cholesterol. Some statins have shown varying degrees anti-microbial effects. Pitavastatin is a recent addition to this class of drugs. Does pitavastatin have the same effects on E.coli as the four other statins, and how do they compare? To answer this, three samples of each medicine were dissolved into an agar medium that was then infected with a sample of bacteria, E.coli. Three controls without medicine and just the agar medium were also infected as a comparator. The samples incubated for 192 hours at 35-37° C, and observations were made every twenty-four hours to monitor bacterial growth. In the first twenty-four hours, there was growth amongst the bacteria. However, pitavastatin appeared to be bacteriostatic in the subsequent days. Simvastatin had a surge of bacterial growth initially, but manifested as a bactericide. The other three medications all had similar growth trends to each other; they slowed growth compared to the control. Conclusively, the cholesterol medicine has minimal effects on the bacteria. The statins all had some bacteriostatic effects and simvastatin showed bactericidal effects. This study holds importance in the medical field as statins are heavily prescribed and may have important effects on the normal bacterial growth in the patient's colon.

202. EFFECTIVENESS OF BACTERICIDES ON CULTURED PLATES

Kelsey Esposito, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. Jason Kelsey, Dr. John Wnek, and Mr. Adam Sprague.

E. coli is a type of bacteria that can be found on the food and produce that is consumed by humans; however, certain products are available to rid produce of any living bacteria. There are different types of treatments; ones that are sprayed on growing plants and others that are sprayed on already harvested produce. To find which type of treatment is the most effective in eliminating bacteria, five different products were sprayed on living bacteria and the efficiency was measured through the percent of bacteria dead in a given time period. Amidst the designated time intervals, the percent of dead bacteria on each plate had no significant difference between the two different types of bacteria-killing agents. Therefore, neither type of bacteria spray, based on real-life application timing, is more beneficial than the other. This information can be used when consumers purchase products for ridding bacteria on produce.

203. BACTERIAL GROWTH ON MUSICAL INSTRUMENTS OF DIFFERENT COMPOSITIONS

Emilija Jeskeviciute, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mrs. Kelly Kelsey

In the 21st century, playing musical instruments has become an everyday past time for people of all ages. Playing musical instruments comes with many benefits such as increased concentration and a boost in social skills. However, instruments also harbor many dangerous bacteria that are known to cause respiratory related illnesses. The number of different bacteria found on an instrument relies on how well the instrument is taken care of and how routinely it is cleaned, although there may be another inevitable factor that determines the amount of bacterial colonies found on a particular instrument. The different composition of an instrument may also play a factor in the amount of bacterial colony growth that later form on the instrument. To reason out whether composition played a role in bacterial growth on an instrument, 10 instruments from a local marching band were collected. The instruments were swabbed for any potential bacteria and the bacteria later transferred onto agar plates where it grew for around one week. The different amounts of bacterial colony growth found on each instrument was collected and research on each instrument's mouthpiece was also carried out. The data was then analyzed to see if there was any relationship between an instrument's mouthpiece composition and the number of bacterial colonies. It was found that the amount of bacteria relied somewhat on an instrument's composition: reed instruments had the highest number of bacterial colony growth, followed by instruments made from yellow brass (copper and zinc).

BACTERIOLOGICAL AND MICROBIOLOGY (CONTINUED):

204. DOES A TREATED APPLE SLICE SHOW MORE RESISTANCE TO ENZYMATIC BROWNING THAN AN UNTREATED SLICE?

Kyle Macauley, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Kelsey

Enzymatic browning is a chemical process that occurs in fruits that causes brown pigments to appear in the fruits. There are many ways that supposedly allow fruits to resist enzymatic browning for a period of time. Some of these methods include a mixture of honey and water being applied to the fruit slice, a mixture of lemon juice and water being applied to the fruit slice, or a mixture of sugar and water being applied to the fruit slice. Do any of these methods of prevention actually help? To come to a conclusion, an experiment was conducted where apple slices were observed for the effects of enzymatic browning. The apple slices were divided into four groups: untreated, those treated with lemon juice, those treated with honey, and those treated with sugar. There were three apple slices in each group, and they were left to sit for ten days, in sealed plastic bags. It was observed that the apple slices treated with the mixture of sugar water showed little to no enzymatic browning, while those treated with the mixture of lemon juice and water and those treated with honey and water showed equal amounts of or more enzymatic browning than the untreated apple slices.

BEHAVIORAL SCIENCE - HUMAN REACTION AND MEMORY:

301. THE EFFECTS OF SLEEP, PHYSICAL ACTIVITY ON TEST SCORES

Daniel Baxter, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Test taking is an important strategy to master in today's school system. A sufficient amount of sleep and physical activity are often recommended as strategies to increase scores. It was hypothesized that the stronger relationship would be found between test scores and sleep. It was hypothesized that, controlling for age, sleep levels are the most accurate predictor of test scores. The Preliminary Scholastic Assessment Test (PSAT) was used in this survey. A survey asking participants age, grade, PSAT Scores, average sleep levels, average physical activity levels was used to collect data. Data was collected between December 25, 2013 and February 1, 2014. When the data for the relationships between PSAT Scores and Hours of Sleep per Night and PSAT Scores and Hours of Weekly Physical Activity was analyzed for each year, zero r-squared values above 0.5 were observed and the data were considered insignificant. Because of the inconclusive r-squared value, the hypothesis was neither supported nor rejected and further study is needed. Other factors such as dietary habits and nutrition may influence cognitive achievement. A multitude of smaller factors may also influence test scores.

BEHAVIORAL SCIENCE - HUMAN REACTION AND MEMORY (CONTINUED):

302. DOES COMPETITION AFFECT REACTION TIME?

Christopher Daukshus, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Jason Kelsey

Reaction time is the elapsed time between the creation of a stimulus and the reaction towards it. It is believed by many competitors that the pressure to win improves some skills, such as reaction time, during a competition. Does competition and the pressure to succeed really affect a person's reaction time? Used in this study was the computer generated reaction time test, "*Think Fast*" in which reaction time is determined by the speed objects are avoided on the screen. Twenty-six students, ages 14 to 17, were asked to take the test at two separate times. Before the second test, participants were informed that the person with the fastest reaction time on the test would receive a mystery prize. Data was analyzed as a whole and also broken down by gender. After analysis, it was determined that there was no correlation between competition and reaction times. Gender did not have an impact on these results. This study helps support that reaction times do not improve during competition.

303. DOES MUSIC HAVE AN EFFECT ON PEOPLE'S MOODS?

Katherine Kutina, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. David Werner

Music is unique because it cannot be seen or felt, but can only be heard and interpreted through the brain. Since the brain controls the conscious and subconscious mind, then hypothetically it can convey and control human emotion and their mood. This study was conducted to see if different genres of music had an effect on how the person feels. A sample group of twelve people from the ages of fourteen to fifteen were asked to listen to eight different songs from different genres, and were told to answer a series of questions regarding their mood while listening to them. The purpose was to determine whether music could affect a person's mood. It was concluded that music does play a role in how a person feels. The more aggressive the music is, the more agitated a person will feel; on the other hand, the more serene the music is, the more calm, melancholy, and even content a person will feel. The results also depended on what kind of music the person already prefers. However, in the end, 100% of the participants felt a change in mood.

304. DOES GUM AFFECT SHORT TERM MEMORY?

Joseph Leclercq, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Jason Kelsey

Memory has been believed to be triggered by various senses such as taste, sight, and hearing. In order to test to see if a subject's short term memory is affected by taste gum was used to detect change. There were 8 subjects and they were all ages 14 or 15. The test was completed twice for more accurate results. A subject completed a test where numbers were shown for ten seconds and then the numbers had to be matched. The numbers were in a four by four square. The second time the test occurred gum was given out. The data was then recorded to show timing and the amount wrong. The results showed that while gum did not affect the accuracy of the results, it did increase the impulsion of the subjects. The time taken to complete the test decreased for a majority of the tests. The amount of tests that had more or less wrong were the same.

BEHAVIORAL SCIENCE - HUMAN REACTION AND MEMORY (CONTINUED):

305. DO DIFFERENT GENRES OF MUSIC AFFECT MEMORY AND HAND-EYE COORDINATION DIFFERENTLY?

Daniel Leifert, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Music has been an important part of human lifestyles for centuries, and also holds an important role in our brains. Many studies have shown correlations between music/musical proficiency and proficiency in special reasoning and memory related tasks. But are brain functions affected differently by different genres of music? Do any other factors, such as gender or participation in video games/sports, affect these brain functions as well? To answer these questions, roughly 100 participants were gathered and instructed to listen to a specific genre of music: classical, rock, jazz, dance, or no music at all. While listening to the music, they each completed 3 online tests to compare their memory and hand-eye coordination abilities with the other participants. Questionnaires were filled out afterwards. Data gathered from the questionnaires was separated into different groups for comparison. Participants that listened to different genres of music were compared, as well as different genders. The results of this experiment were largely inconclusive, as there was no correlation within any of the data gathered. This suggests that there is either no benefit/hindrance to listening to any type of music during activities that require memory or hand-eye coordination.

306. THE EFFECTS OF THE TIME BETWEEN EATING AND TESTING

Kayla Mitchell, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

The term IQ refers to the term Intelligence Quotient which is a measure of general knowledge. The average IQ score ranges from 90-110. However, many factors may affect the score one receives on a test, such as the amount of sleep one receives the night before, the food they eat, and their motivational state. In this study, the effects of the time gap between one eating breakfast and taking an IQ test on one's IQ score was tested by having several students take a series of three IQ tests, each with a different time interval of either 40 minutes, 100 minutes, or 120 minutes between the time they ate breakfast and took the test. Several correlations were observed, showing that eating approximately 40 minutes before taking an IQ test optimizes one's performance as opposed to eating 100 or 120 minutes before testing.

307. HOW DOES HANDEDNESS AFFECT REACTION TIMES?

CJ Schaefer, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Reaction time is the amount of time that it takes for an organism to react to stimuli. Handedness is a preference to use one side of the body over the other. Thus, being ambidextrous means that there is "no body side preference". For this study, it was hypothesized that the preferred (dominant) body side would have a marginally faster reaction time than the non-dominant side. To obtain the necessary information to determine the effect of handedness on reaction time, five right-handed persons and one left-handed person had a ruler dropped between their thumb and forefinger. The distance it was caught at was recorded and converted into seconds using the formula $\sqrt{(2y) / (g_0)}$, where y is the distance, and g_0 is the acceleration due to gravity. When averaged, there was no significant difference in reaction times; however dominant reaction times were faster both on average, and individually.

BEHAVIORAL AND SOCIAL SCIENCE:

401. IS HANDWRITING MORE BENEFICIAL TO ONE GENDER?

Madeline Alzamora, Block 4 Science Class, Marine Academy of Technology and Environmental Sciences (MATES), Advisor: Mr. David Werner

Numerous studies have shown the perks of handwriting information against typing it: improved memory, increased creativity, early warning signs against debilitating diseases, and more. But does handwriting prove more beneficial for one gender? Twenty-six participants between the ages of fourteen and seventeen took a short test to determine the best way for them to learn (visual, auditory, and kinesthetic) and were then assigned a note sheet for the first test to fill out. They were individually told to handwrite or type the answers. The first test, ten questions and open-ended questions on the history of chewing gum, was failed by males and females, those that handwrite and those that type alike. The second test, a ten question, multiple choice assessment on the history of aspirin, yielded better overall results. Many conclusions came from this test. As a whole, males seem to have an increased likelihood of being kinesthetic learners compared to females, and students are more likely to succeed on multiple choice tests as opposed to open-ended. However, a correlation between gender and handwriting was not found.

402. DO SECTIONED PLATES INFLUENCE PEOPLES' FOOD CHOICES?

Brianna Ford, Block 4 Science Class, Marine Academy of Technology and Environmental Sciences (MATES), Advisor: Dr. John Wnek

Humans are constantly given opportunities to make decisions, and companies even hire people to help their customers make desired choices. With much of what people choose seemingly not being in their own hands in the corporate-run world of today, do people have the ability to consistently make food choices with varying plate conditions? Will altering the appearance of plates and specifying areas for food to be placed drastically alter the food choices that people make? It has been shown that plate size has an influence on food group choices and the volume of food eaten, but do sectioned plates have a similar effect? Participants were given a learning style quiz and were given instructions on coloring plates according to their preferred style. The results of this study suggest that some food groups are less likely to be influenced than others and that some groups of people are more likely to make certain choices than other people. The data collected from this experiment could be used to help chefs or dieters make preferred decisions about the amount of food served on plates.

403. IS THERE A CORRELATION BETWEEN PERSONALITY AND MORALITY?

Edward McLaughlin, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. David Werner

Many people believe that their personalities affect their everyday decision making. This experiment was conducted to determine if there was a relationship between the personal characteristics and choices of individuals. To test this theory, participants were asked to first take a personality test to dictate their traits, such as openness, Conscientiousness, and extroversion. Each trait was measured on a scale of one to five, and the highest out of the five qualities was used as the participant's primary quality. Afterwards, participants were given ten riddles and a sheet of corresponding answers. They were asked to complete the riddles to the best of their abilities, and they were informed that they could use the answers at any time. It was then taken down if they A: Used the answers for the entire sheet, B: Didn't use the sheet, or C: Only used the sheet if they were having difficulty. The collected data revealed that there was seemingly no correlation between traits and decision to use the provided answers. Out of all the participants, at least one of each of the five personality categories used the answers to complete the riddles. In conclusion, it appears that there is no relation between these two factors.

BEHAVIORAL AND SOCIAL SCIENCE (CONTINUED):

404. CAN HEALTHY FAST FOOD SURVIVE?

Alex Parsells, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Dr. Wnek, Mr. Werner, Ms. Meaghan Martin, and Ms. Sarah Jakositz

The purpose of this project was to determine whether the movement to create healthier options in fast food restaurants has a future and will be well-received by Americans. To aid in determining this, a survey was created and distributed to customers of the fast-food restaurants Chick-fil-A and KFC. The purpose of the survey was to determine fast-food customers' eating habits currently, their grasp on nutritional information of common fast-food menu items, and how important they believe healthy food is at fast-food restaurants. The results indicated that, while the majority of customers would like to see healthier food in fast-food restaurants, price and speed in preparation were their priorities; because of this, it is necessary that healthy fast food not inconvenience the customer by being priced higher or taking longer to prepare.

405. CORRELATION BETWEEN COLOR PREFERENCE AND AGE/GENDER

Cameron Perry, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Laura Perry

People always prefer certain colors over others. People of varied ages were surveyed to see if there was any correlation between their ages and gender when it came to their color preference. The data from the survey was then put into graphs and data tables so it could be analyzed easier. It was seen that people twelve and younger, both boys and girls, liked colors more because of things they enjoy, like spider-man, or because it reminds them of their parents. Teenagers either don't have a reason or it reminds them of something like the sky or the ocean. Adults prefer colors that are calming or comfortable to them. When it comes to male versus female color preference, females prefer brighter colors and used more shades of the color, whereas males chose darker colors.

406. IS THE TECHNIQUE OF ODD PRICING AN EFFECTIVE WAY OF ATTRACTING CUSTOMERS AND INCREASING REVENUE?

Elias Saavedra, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Odd pricing is the practice of lowering a price by 1, 5, 10, or 25 cents in order to alter the price into a form that the last digit is a 9 or a 5, in order to give the illusion that a product is significantly cheaper than it actually is. The aim of this project was to identify if the common practice of lowering a price by 1, 5, or 25 cents is an effective way of drawing in more customers and increasing revenue. To find out, experiments were conducted in which a survey consisting of brief questions were given to a handful of people. This survey consisted of choices between various prices, which had a difference of <\$0.25 USD. After the data was compiled, it was concluded that ~90% people prefer products that are priced oddly, which also leads to greater financial success for the business selling the products. Therefore, odd pricing is still an effective technique that the majority of businesses still use with good reason.

BEHAVIORAL AND SOCIAL SCIENCE (CONTINUED):

407. IS MUSIC GENETIC OR TAUGHT?

Samantha Swider, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Music is a very popular pastime. People of all ages, religions, races and backgrounds learn musical instruments as well as vocal techniques. There are some obvious results of music lessons. Music students learn to read music, play their instrument/vocal better and usually students have a better understanding about music. However, some people can go through years of musical training without seeing much improvement. This study aims to discover the truth about musical studies and see if music is taught or inherited. For this study, a variety of students with different levels of musical experience were asked to take a simple test to determine their understanding of pitch on a basic level. The results support the idea that an understanding of pitch and music is a taught skill, contrary to the assumption that an understanding of music is inherited.

408. EFFECTS OF MUSIC ON CONCENTRATION

Richard Burt, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Over the course of my research I planned to find whether music improves concentration or not. I performed tests where people would tell me their favorite music and their least favorite music, and then they would go through a concentration test. The first test was with no music to serve as baseline to compare the other results to; the second was performed with their favorite type of music; the third was performed with their least favorite type of music; the fourth was with classical music. Using the first test as a comparison, the second test had mixed results. For people who had lyrics in their favorite type of music tended to have decreased concentration, while people with music without lyrics had increased concentration. The third test had an overall result of having decreased concentration. The fourth had increased concentration. Final results indicated that lyrics tended to decrease concentration, and music with lyrics tended to increase concentration if the subjects enjoyed that type of music. Classical music was the most effective in terms of improving concentration.

BOTANY:

501. WHAT ARE THE EFFECTS OF THE INCREASED LEVELS OF CARBON DIOXIDE ON PLANTS?

Mark Baker, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

In recent years the increased levels of carbon dioxide are intensifying the effects of Global Climate Change. How are the increased levels of CO₂ going to affect us and our environment? The carbon dioxide increased 150% since 1990 to 2008, but now more than five years later these effects are even more drastic. The increased levels of CO₂ could make less of an impact to our Global Climate if they are utilized by plants. Some plants can process CO₂ more effectively and may be important for future reductions in atmospheric CO₂, while others may not grow well and undergo greater mortality with increased levels of CO₂. Thus, plants that directly impact the world's food supply need to be studied as to the impacts with increased CO₂. This experiment was conducted to determine the growth of plants in response to CO₂ exposure. Plants were grown in a CO₂ chamber (capsule) and also in a controlled setting (non-capsulated). The beans (Garden Beans Golden Wax Improved, and Garden Beans Burpees Tenderpod) had faster growth than the radishes (Radish Cherry Bell, and Radish French Breakfast) in the CO₂ experimental capsule. Despite the beans growing faster, they eventually died prior to maturity, while the radishes all died prior to any growth. Plants in the controlled setting grew consistently with no mortality.

BOTANY (CONTINUED):

502. WATERING SCHEDULE FOR OPTIMAL GRASS GROWTH

Samuel Brodetsky, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Dr. Igal Brodetsky

Grass is the most irrigated crop in the US. Water is fast becoming a scarce resource. Saving on water usage is paramount in all aspects of our life. Most grass in the US is overwatered. Grass is irrigated 3 times more than corn. It will be beneficial to find the optimum amount of water grass needs for optimal growth. This study attempted to ascertain the optimal watering schedule for grass under varying environmental conditions. Since the study was done over the winter, the grass had to be grown indoors. The experiment set up three different watering levels at low and high humidity conditions. The grass growth was recorded weekly. After each recording the grass was cut to simulate normal lawn mowing. The study found that past a certain watering amount the grass growth leveled off, thus wasting water. The optimal watering amount was calculated using mathematical extrapolation. This project was limited in the amount of environmental conditions that could be studied. Although it does show a trend, more study is required to figure out the optimal watering schedule under all climate conditions.

503. PIGMENTATION IN FLOWERS: INHERENT COLOR VS ORGANIC DYES

Jessica Carrer, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Werner

The purpose of this experiment was to discover the flowers (tulips) reaction to added organic dyes in its water. Store bought, cut red, yellow and white tulips were used for the experiment. During the two 1 week long trials, the colored tulips were placed on a separate vase from the white ones. These colored tulips were used as comparison for the white ones that were gradually dyed. Results showed that the white tulips had streaks of tinting throughout their stems and petals. It was also recorded that the tulips with dyed water did not absorb as much water. It was discussed that the plants may have detected the dye as a foreign object in the water and therefore consumed less water to keep from absorbing the dye. The tulips with dyed water did wilt and die faster than the control set of naturally colored tulips. It was concluded that natural pigmentation creates a more vibrant color and proves to be healthier for the flowers.

504. SUNFLOWER GROWTH UNDER DIFFERENT SPECTRUMS OF LIGHT

Ryan Jones, Block 2 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Sunflowers need a source of light to go through photosynthesis and continue to live. In nature, sunflowers use sunlight as the light source. In this experiment, sunflowers were supplied with sunlight, incandescent light, and fluorescent light respectively to see which plant grows the best. I set up three sunflowers and provided them with equal quality soil, water, and environment. Each plant received a different light, and every seven days the height of each sunflower was recorded. After thirteen weeks data was no longer collected. It showed that sunflowers grew the best under the sunlight due to its species adaptation to the light. The sunflowers grew the slowest and died under UV-light, showing that it is not healthy for this species of plant.

BOTANY (CONTINUED):

505. WILL MICROWAVING WATER IN PLASTIC AFFECT PLANT GROWTH?

Olivia Kaiafas, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Werner

In recent years the safeness of microwaving food in plastic containers has become questionable. Many studies show that microwaving food in plastic containers can leach toxins, called plasticizers, from the plastic into the food, which could have harmful long-term effects. In this study 3 species of plants received water that had been microwaved in different kinds of plastic containers. The plastics chosen were Polypropylene and a BPA free plastic. The average height and number of leaves of each species of plant was recorded each week. The results for each species of plant were then analyzed. The results showed that plants watered with water microwaved in polypropylene plastic didn't not grow as much as plants that received water microwaved in glass or BPA free plastic.

506. WHAT IS THE IDEAL LIGHT LEVEL FOR GROWING PLANTS?

Michael Luckhowec, Block 3 Science Class, Marine Academy of Technology and Environmental Science
(MATES), Advisor: Mr. David Werner

This experiment tested the hypothesis that plants grow best when provided with 12 hours of light daily. Three groups of six organic basil plants were placed under lamps set for different amounts of time with the light on. One group had no lamp, with only the sunlight from a south-facing window to provide it with light. Another group was placed under a lamp that provided the plants with twelve hours of light daily, and the last group was placed under a lamp that was constantly on, twenty-four hours per day. The plants with only sunlight, which was about 8-10 hours of sunlight during the winter, grew very little over the course of the fourteen week long experiment. The plants exposed to twelve hours of light grew semi-well, growing to a moderate height, and the plants exposed to twenty-four hour light were the tallest plants out of all of the groups, making twenty-four hours of light exposure the most effective way to grow indoor plants year round.

507. THE EFFECTS OF TEMPERATURE ON DIFFERENT FRUITS

Zane Noguerras, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

Many people will primarily store their food within their refrigerator for long term storage. This is because they believe this is the best way to store fruit and keep it fresh the longest, but does the refrigerator help it truly last longer? To come to a conclusion, tests were made on four different fruits to determine where the best place to store the fruit is. All four fruit were placed into three locations: outside, indoors, or within the refrigerator. Also, each location had two of each fruit, a whole and a half. These fruit were all recorded over the course of 30 days to see the change of mass and volume of each fruit. The hypothesis was that the fruits in the refrigerator were going to store the apple the best, with storing it inside would better suit the orange, mandarin, and banana. The conclusion at the end came to disprove the hypothesis, showing that the refrigerator was able to store all of the fruits the best over both inside and outside.

BOTANY (CONTINUED):

508. HOW DOES DETRITUS AFFECT MARIGOLD GROWTH?

Kaylee Shepard, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. David Werner

This project provides information to demonstrate how detritus affects the growth of marigolds. Detritus is sand, soil, or other material made by erosion of organisms usually found at the bottom of the marsh. Nine flower pots were used, three filled with soil, another three filled with detritus, and the others filled with a mixture of both. After fifty days of measuring the plants, all of the data was evaluated. All of the marigolds in soil sprouted and only one planted in the mixture was able to grow, the other flowers showed no sign of growth. The conclusion that detritus has negative effects on marigolds was understood after the experiment was completed.

ENVIRONMENTAL:

601. DO SAND FENCES AND BEACH WIDTH CORRELATE IN INCREASES?

Evan Chester, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Dave Werner

A sand fence is a type of fence that is utilized for accumulating windblown sand in a specified place. Sand fences are often used for beach replenishment and for the creation of artificial sand dunes, which protect exposed shorelines. In Point Pleasant, along the coast of central New Jersey, sand fences were erected to form artificial dunes. Once a week for 14 weeks, the height of the sand on the fence and the width of the beach at five locations along the sand fence were measured and recorded to see if there were any relation between the two variable's increases and decreases. Additionally, a 6th site, located midway between the 1st and 2nd, to see if changes occurred faster or slower in the middle as opposed to the end of the fence. Finally, sand samples were taken from the five primary sites at the fence and at the berm, and were subsequently sieved to find if there was a difference or correlation in the granularity of the sand. The results of this study suggest there is no correlation between the height of the sand on the fence and the width of this beach. However, testing over a full season is necessary in order to yield more accurate results, especially during the summer months when there tends to be more of a depositional process in dune accretion.

602. EFFECTIVE DUNE FENCING METHODS ON LONG BEACH ISLAND, NJ

Colleen Cochran, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Jason Kelsey

Dunes on Long Beach Island, New Jersey have experienced complete devastation from Superstorm Sandy. In many towns along the New Jersey coastline, strong primary dunes helped to limit the amount of damage to the communities immediately behind them. The location studied in Brighton Beach, Long Beach Township, had dunes that were completely engulfed by the ocean. Long Beach Township tried to restore the dunes by manually pushing up sand. Although, this produced immediate visual results providing great comfort to oceanfront homeowners, it did not provide a sufficient barrier against erosion on the months to follow. Previous studies have suggested that the most efficient way to accrue sand is dune fencing to capture wind-blown sand. On Long Beach Island fencing is commonly arranged in a straight fashion from north to south. In this study a modified method was created, by attaching diagonal east to west lateral sections to the existing fencing. This method exhibited faster vertical sand accretion than straight fencing. The extended surface area and angles of the fencing is believed to be the factor affecting sand growth. Wind patterns also play a key role in dune growth. Without a sufficient wind speed the sand cannot be blown up onto the dunes. This study clearly suggests that the modified fencing increases sand accretion along Long Beach Island dunes.

ENVIRONMENTAL (CONTINUED):

603. THE EFFECTS OF AN INCREASED EXPOSURE OF CARBON DIOXIDE ON PLANT GROWTH

Katherine DeMario, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

Trees are specially adapted to absorb carbon dioxide and release oxygen into the environment. Carbon dioxide levels have been increasing in the past decade. The current carbon dioxide levels in the atmosphere is approximately 397 parts per million. The rate of carbon dioxide accumulation has been increasing at a steady rate of about 2 parts per million each year. Higher levels of carbon dioxide stimulated on plants yielded increased plant growth. The growth of the plants controlled at normal carbon dioxide levels of 600-800 parts per million in a closed environment grew significantly less than the plants with additional carbon dioxide. The plants used for experimentation were the eastern white pine, Norway spruce, and the Douglas fir; these plants are common in southern New Jersey and are found throughout the East Coast of the United States. The plants with additional carbon dioxide had a substantially higher amount of growth than the plants at normal carbon dioxide levels. This study suggests that the eastern white pine, Douglas fir, and Norway spruce could be used to absorb the increased levels of carbon dioxide as and should be considered as candidate species in reforestation efforts.

604. ESTIMATION OF CARBON DIOXIDE LEVELS IN THE CRETACEOUS PERIOD USING *EXOGYRA SP.*

Michaela Lozada, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

Exogyra sp. was the species found in the late Cretaceous Period, 65 million years ago, and most similar to the North American oyster, *Crassostrea virginica*. Once a flourishing species in what is now the New Jersey area, their fossils are now extremely common at Big Brook, New Jersey. The calcium carbonate levels of specimens of these fossils and discarded shells of *Crassostrea virginica* were approximated to the nearest hundredth through multiple acid-base titrations. *Exogyra* collected from Big Brook and *Crassostrea* collected from Barnegat Bay, NJ were ground into a powder and dissolved as part of the titration process. The *Exogyra* shells had an overall significantly higher amount of calcium carbonate. This suggests that the rising carbon dioxide levels in the atmosphere are affecting *Crassostrea virginica*'s ability to make calcium carbonate. It could also indicate that bivalve predation shifted and the lack of predators could have led to a decreased shell thickness. These results help show the general effect that the atmosphere is having on bivalves and possibly predation.

605. ROOT STRENGTH COMPARISON OF ASIATIC SAND SEDGE (*Carex kobomugi*) AND AMERICAN BEACH GRASS (*Ammophila breviligulata*)

Courtney Monchinski, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Dave Werner

The tensile strength of roots is the maximum amount of stress the root of a plant can take before breaking; this is usually measured in N (Newtons) or kg (kilograms). In the dune ecosystem, this root strength determines the success of the dune; if the roots are weak, the dune will not survive storms and other phenomena. In New Jersey, there are two main competitive plant species thriving in the dunes: *Carex kobomugi* (Asiatic Sand Sedge) and *Ammophila breviligulata* (American Sand Sedge). Both plant species are known for their root strength, but *C. kobomugi* is one of the least wanted plants New Jersey because it is an invasive plant that threatens the delicate dune ecosystem with overcrowding. Many seek to remove *C. kobomugi* from the dunes, which will help to maintain native dune species, but can affect the stability of the dune structure. At Island Beach State Park, *A. breviligulata* and *C. kobomugi* were observed in terms of growth and their root strengths were tested. Five representative samples of each species were brought to MATES for further testing on stem strength. It was found that *A. breviligulata* had stronger root strength than *C. kobomugi*, and it would be a beneficial plant to maintain over *C. kobomugi* in our dune systems.

ENVIRONMENTAL (CONTINUED):

606. EFFECTS OF MOUNTAIN LAUREL ON SOIL NITRATES

Vincent Musanti, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. Dave Werner and Mr. Jason Kelsey

This study is designed to determine the abundance of Mountain Laurel (*Kalmia latifolia*) and its relation with mixed temperate overstory stand density. Total soil nitrates were tested in order to explain its strong allelopathic effects on well-established humus layers in oak-dominant forests. Population density (stems/m²) of *K. latifolia* were sampled along belt transects in seven areas in a Jackson, New Jersey forest, while B horizon nitrate samples were tested (ppm). Quantified results suggest that *K. latifolia* has a significant negative correlation with overstory stand density ($p < 0.0001$) in greater populations of *K. latifolia*. Within a range of 0-41 stems/m², nitrates showed no correlation with stem density but instead a significant loss in total NO₃⁻ levels ($p < 0.0001$). Other factors such as soil moisture, pH, forest age, and light deficiency may have been more present, thus prohibiting further overstory development compared to nitrates and allelopathic litter composition. This research may provide a better understanding of nitrate leeching and soil dynamics within forests.

607. DOES THE AMOUNT OF LITTER ON THE BEACH CHANGE WITH THE TIME OF YEAR?

Dean Sussman, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. David Sussman

The beach is always being traversed by people, and consequently always being littered on. However, the beach is much more heavily occupied in the warmer months than in the colder ones. Reason would follow, then, that there would be more litter when the weather is warmer than when the weather is colder. But does this correlation show up when tested in real life? An area of a Point Pleasant beach was selected for testing, and was tested each week from October until February. Each week roughly the same amounts of litter were collected at first, until the later weeks, where significantly smaller amounts of litter were collected. However, this can be attributed to the fact that we were collecting the litter each week in the same place. This meant that residual litter did not stay to be there the following week; also, greater amounts of litter were clearly seen on either side of our collection area than inside of it. To conclude, data was collected by locating litter on a particular area of a beach. The only difference in the amount of litter each week seemed to be due to litter collection in previous weeks. However, further testing in the spring and summer months would be needed to confirm findings.

HUMAN HEALTH AND FUNCTION:

701. THE EFFECTS OF EYE COLOR ON LOW LIGHT VISION

Edward Fengya, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Human low light vision is known as scotopic vision and is dependent on the amount of light that enters the eye and hit the rod cells in the retina. Many people are aware that people with lighter eye colors are more prone to squinting in bright light conditions. It is also important to wear eye protection in bright light conditions, because the lighter pigment of the iris lets more light into the eyes thus possibly causing harm. However, little research has ever been performed on the effects of lighter eye colors on low light vision. To perform this test it was necessary to find a sample text that had everyone of all reading abilities on an equal level. Thus a sample text was chosen in Latin in order to disallow people from speed reading by knowing the shapes of words. Participants were chosen with a roughly equal amount of light eyed and dark eyed people. The participants were introduced into a room with all of the lights on with a sample text 4 feet away from them on a wall. The participants were told to read the sample text as fast as possible while still maintaining accuracy. The times and the number of mistakes made by each participant was then recorded and grouped by eye color. Blue, Green, and Hazel eyes were considered "light" in the testing and Brown was considered "dark" for the experiments. The data was then analyzed for a trend between light eyes and low light vision. A correlation was identified between accuracy and time with people with light colored eyes compared to people of darker eye colors.

702. WHICH BRAND OF LIQUID ANTACID HAS THE FASTEST REACTION TIME?

Krishna Fernandez, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Dr. John Wnek

Heartburns are burning sensations felt in the chest caused by unusually high levels of hydrochloric acid in the stomach regurgitated into the esophagus. To relieve this pain, an antacid in the form of a liquid or tablet is consumed. Liquid antacids are preferred over tablets because suspensions act faster than solutions, and suspensions offer more surface area for the antacid to neutralize hydrochloric acid. All liquid antacids neutralize the acidity of the stomach, but if different volumes of hydrochloric acid were added to the solution, which brand of liquid antacid would react the quickest and turn from acidic to basic? In this experiment, five different brands of liquid antacids were utilized, and different volumes of HCl – 20 mL, 40 mL, and 60 mL – were added to the suspension composed of water, liquid antacid, and Phenolphthalein Indicator. Phenolphthalein Indicator was used to indicate whether the suspension was acidic or basic. Because this experiment was dependent on the color change of the Phenolphthalein Indicator, the reaction times for four of the antacids were inconclusive due to no indication of the suspensions turning from basic to acidic or acidic to basic.

703. IMPROVING NIGHT VISION

Georgia Garrow, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

The retina of the human eye contains rods and cones. The rods function in lower levels of light and the cones function in higher levels of light. The rods take time to adjust from the dark to light. Many peoples' eyes have difficulty adjusting to the dark. This experiment was established to determine if covering one eye before going in the dark improved night vision. 20 individuals- 10 people of age 10-20 and 10 people of age 30-40, were subjected to an obstacle course in the dark. Before completing the course, the individuals would cover an eye in the light for 5 minutes in hope of improving their sight when completing the course. The data was analyzed into three categories: which eye was covered, age groups, and males versus females. Adults showed slightly more improvement than children, and males and females had almost the same improvement. The right eye showed a small amount more improvement than the left eye. It was found that covering one eye before completing the course was very successful in improving night vision.

HUMAN HEALTH AND FUNCTION (CONTINUED):

704. ARE STUDENTS IN A PROPERLY LIT ENVIRONMENT?

Dylan Manuguerra, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. Jason Kelsey and Dr. John Wnek

A constant health issue in this world's day and age is declining vision. A cause of this is that people are constantly sitting at computers all day either working, surfing the web, playing video games, etc. Whilst sitting at a computer all day, one can develop Computer Vision Syndrome (or CVS for short); this is when one's eyes become irritated, dry, and strained. Over time, CVS starts to induce long term damage one's eyes. Students are working on computers almost daily in school environments, either for projects, essays, or classwork. So, are students in the proper environment so that they will not get CVS? To come to a conclusion, 80 laptops were tested along with the ambient lighting in several rooms. These sources of light were measured in lux, (or lumens per square meter), which is light intensity. Ambient and computer light intensity averages were added together to determine whether rooms in the average high school met the standard of light intensity for daily computer work. From the data, it was determined that the average high school (when working on computers) has a much higher light intensity than they are supposed to.

705. EFFECTS OF GENDER ON HEARING

Alexandra Passaro, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. Jason Kelsey and Dr. John Wnek

The ear is able to hear many different frequencies of sounds. Studies have shown that as you age your hearing ability lessens, but has anyone thought of gender when it comes to hearing? To come to a conclusion, I conducted a simple hearing test with the help of the school nurse to six students. The students consisted of three females and three males. The test administered was on both the left and the right ear. The left and right ear's tests were broken down further into several frequencies. The subjects were told to raise their hand when they heard each change in frequency. After the data was collected, each test was separated and analyzed according to gender in order to identify a correlation between the surveyed individuals. Each gender had 100% correct accuracy. Unfortunately, these results revealed no certain gender having a better hearing ability; therefore, no correlation was identified between the genders, showing no relation to hearing loss in the specific genders.

706. WHICH GENDER HAS BETTER PERIPHERAL VISION?

Shaina Patel. Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Males are most likely to suffer from color blindness than women, but women do have a very small chance of suffering from color blindness. The purpose of this research project was to find which gender, male or female, had better peripheral motion vision, and better peripheral color vision. The research was conducted by making a vision protractor. Then the volunteers would have to detect an object in motion in their peripheral while looking straight ahead. The volunteers would also have to determine the color of the object that is being moved in their peripheral, also while looking straight ahead. The results show that females have a better peripheral motion vision, and better peripheral color vision.

HUMAN HEALTH AND FUNCTION (CONTINUED):

707. THE EFFECTS OF EXERCISE ON BRAIN FUNCTION

Alex Welsh, Block 1 Science Class, Marine Academy of Technology and Environmental Sciences (MATES),
Advisors: Mr. Jason Kelsey and Dr. John Wnek

Exercise has been found to have positive effects on the brain function of humans. This is because exercise stimulates the brain in many ways. During physical activity, the heart rate increases and more oxygen is pumped to the brain. The body also releases an abundant amount of hormones that aid in the growth of new brain cells. These are valid reasons that would cause brain function to be positively affected by exercise. However, does exercise actually improve brain function? With the intent of authenticating the proposal that exercise improves brain function, an experiment was conducted on individuals of various ages. The participants were asked to partake in twenty minutes of walking followed by a brief multiplication and division test. These results were then compared to the results of a similar test taken after twenty minutes of sitting. The outcome of this experiment shows no correlation between exercise and brain function.

PHYSICAL SCIENCE:

801. WHAT TYPE OF WOOD IS SUPERIOR WHEN EXPOSED TO DIFFERENT WATER SALINITIES?

Christopher Boyce, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Wood is constantly being exposed to different conditions whether it be terrestrial or aquatic. Because the wood used for building varies between areas, people therefore believe that the wood in their area is the best against Mother Nature. However, is there a wood that is commonly used, but not labeled as the best structure for buildings? Wherever you build a structure, it will experience some sort of a weather condition, such as precipitation in the form of rain and snow. These weather conditions depend on the location of the building though, as a buildings near the shore of an ocean will experience salt spray, while inland building will strictly experience fresh water. Taken into consideration, three water solutions were made as followed; fresh water, salt water of 15ppt, and salt water of 30ppt. Three types of wood were utilized in this experiment. Poplar (*Populus*), a hardwood, pine (*Pinus*), a softwood, and red oak (*Quercus rubra*), a hardwood. After all types of wood being submerged in all three water solutions, red oak claimed victor as the supreme wood against water.

802. DOES TEMPERATURE AFFECT SAXOPHONE INTONATION?

Liam Dorsey, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

Intonation is something that has been debated for centuries. Since the jazz age and the rise of saxophones, this has become even more important, especially concerning factors such as temperature. In outdoor playing conditions where in the summer the temperature can exceed 100°F, it is extremely important as a musician to be informed about intonation. Musical theory explains that intonation is measured in cents, and that being a number of cents lower than the standard is being “flat” and the opposite is being “sharp”. In this experiment, intonation correlating to temperature is tested with heat lamps, and an alto saxophone. This will determine how intonation is affected, and if the average human will be able to tell the difference. I hypothesized that as the temperature rises, the instrument will become sharp. The results were quite indecisive. The first trial generally followed my hypothesis while the saxophone actually became flat during the second trial. After further research, it was concluded that more trials were needed to prove any hypothesis regarding intonation and temperature. It was also concluded that in a band setting, a human would be able to tell if instruments were out of tune.

PHYSICAL SCIENCE (CONTINUED):

803. HOW BEACHFRONT CONDITIONS AFFECT BOARDWALK WOOD FLAMMABILITY

Patience Harrington, Block 2 Science Class, Marine Academy of Technology and Environmental Science (MATES)
Advisor: Mr. Jason Kelsey

It is a known fact that damp wood will not burn. But what most people do not know is that when exposed to a flame for even a short burst of time, wood will show long term damage. When large scale fires erupt, people begin to question what to do in order to prevent a mass outbreak of fire for the future. In a study done for the National Institute of Standards and Technology, methods of preparing flame retardant solutions were tested. The study describes the many layers that are being developed in new fire retardant polymers and how they all contribute to the wood's success. The study explains that, though these new solutions are revolutionary, they may be expensive to produce. That is why this experiment focuses on testing easily obtained wood and how flammable or flame retardant it is.

804. WHAT FACTORS AFFECT THE SUSTAIN OF DIFFERENT GUITARS?

Matthew Korwan, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. Dave Werner and Mr. David Petillo.

In the world of music, guitars are important. Even more important is the type of guitar that is used. All of the guitars used in this experiment could be used for different genres of music, such as rock, blues, and jazz. In order to determine which guitars should be used for each genre, the sustain and decibel levels were tested for a Fender Telecaster, Fender Stratocaster, Fender Mustang, Gibson Les Paul, Epiphone (Gibson) Firebird, and a Gretsch Electromatic. The decibel levels and sustains varied based on the type of wood and strings that are used. Also, there are more factors that affect a guitar's sustain, such as its age or whether the guitar has a solid or hollow body. Ultimately, the Gibson guitars had a higher sustain and decibel level, and the Fender and Gretsch guitars had a lower sustain and decibel level. This experiment proves that some guitars with longer sustains should be used for more guitar-heavy genres, and some guitars with shorter sustains should be used for more orchestral genres.

805. THE EFFECTS OF ACID RAIN ON CONCRETE WITH VARYING RATIOS OF PORTLAND CEMENT, SAND AND GRAVEL

Jessica Olsen, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Acid rain is formed by the chemical reaction between sulfur dioxide and nitrogen oxides within the air. As acidic precipitation comes into contact with infrastructure such as highways and bridges, the concrete gradually corrodes, which in turn compromises the strength, durability, and longevity of that structure. On average, New Jersey receives 106.7 cm (42 in.) of rainfall each year. This experiment simulated approximately 753 years of rainfall on each tile, which can portray the long term effects of traffic and the concentrated flows along curb lines. Five varying mixes of Portland cement, sand, and gravel were formed into tiles and put under a constant flow of water with a pH of 4.0 to simulate the battering of acid rain. Four, weekly weigh-ins were conducted, and the final weigh-in showed that the mixture with the highest percentage of Portland cement (Tiles E1, E2, and E3) lost the least material throughout the course of the experiment. However, this experiment did not investigate the strength of the tiles after the introduction of acid rain. Neither large ratios of sand nor Portland cement are beneficial to the durability of concrete. So, although the E batch was the most effective in resisting corrosion, the overall strength of the concrete, once put under extreme pressure, may be compromised and therefore be a poor choice to use for building infrastructure.

PHYSICAL SCIENCE (CONTINUED):

806. DO DIFFERENT SALINITIES OF WATER AFFECT MAGNETISM?

Robbie Roettger, Block 3 Science Class, Marine Academy of Technology and Environmental Sciences (MATES),
Advisors: Mr. David Werner and Dr. John Wnek

Magnets are essentially objects with opposing positively and negatively charged particles existing within the object, and this category includes all matter. Similar to gravity, magnetic forces are acting on us and the world around us constantly, and are present in all matter. However, these forces are sometimes miniscule in strength, and cannot be easily observed or observed at all in some objects (again, similar to gravity). Magnets interact with other magnets because the negatively charged ends of particles in one magnet are attracted by the positively charged ends of particles in another. The addition of salt (NaCl) to water creates a solution of somewhat charged particles as the salt and the water bond. Higher concentrations of salt result in a more charged solution, so would this affect magnets? Would placing two magnets in salt water result in a stronger or weaker magnetic force? Would the distance between these two magnets before they stuck to each other increase or decrease? To answer these questions, a five gallon bucket was used to lower a magnet attached to a rope into different salinities of water with another magnet at the bottom, and the rope length was measured after each test. The results of this study were inconclusive as to whether or not the salt water made any difference in the magnetic strength of the magnets.

807. THE CREATION OF BIOMASS/METHANE IN A SURBURBAN HOUSE

Juan Salazar, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Biomass and methane are really important parts to the present now and the near future, they are renewable resources that help full fill the demand of energy worldwide. This project was conducted to verify if the process that a self-sustaining farm undergoes to create biomass or methane could be reproduced in a suburban house. The initial idea was to see if methane could be created from some decomposing fruits and vegetables concealed in a container and then to burn it to see if there was methane. In the beginning the vessels were filled with air, which is mostly made out of Nitrogen an inert gas, so the vessels were basically 80% full of an inert gas, which would point the experiment in a direction of failure. From the data it was concluded that a gas or gases were being created since the pressure was rising in the vessel. When the gas was attempted to be lit it didn't light up, the gas would only displace the flame. The reason for this is because there was a higher concentration of nitrogen then the other gas created. In the end the experiment was successful in the fact that there was some gas created and that can be proven from other studies that show that methane and ethylene were some of the gases since they are byproducts of decomposition. The methane and the ethylene were just pressurized with the greater concentration of nitrogen that caused it to not be flammable.

SPORTS – PHYSIOLOGY AND FUNCTIONS:

901. HEART-RATE COOLDOWN TIME COMPARISON BETWEEN ALTHLETES AND NON-ATHLETES

Nikolas Decker, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

The heart is a muscle that can grow and adapt over time. Athletes are people who tend to work their heart often. This, in turn, makes them happier and healthier individuals. But, does a person's athletic ability have an effect on how well their heart adapts over time? To test this, initial heart-rates were taken for the athletes and non-athletes participating in the experiment. They were then asked to run on a treadmill for 3 minutes at 5 mph to get their heart rate up. Their post-exercise heart-rate was taken and they were then timed to see how long it would take to get back down to the initial heart-rate. The data was split into two major categories, athletes and non-athletes, and two sub-categories, boys and girls. Athletic boys were found to have the lowest cooldown time. Athletic girls, Non-Athletic boys, and Non-Athletic girls followed respectively.

SPORTS – PHYSIOLOGY AND FUNCTIONS (CONTINUED):

902. EFFECT OF WEIGHT ON THE SPEED AND MOVEMENT OF A BASEBALL

Damon Del Priore, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. David Werner

The game of baseball is played every day without knowing the science behind how the game is working. The weight of a baseball (5oz) is a perfect weight for the use of the game, but the ball surely doesn't stay at that weight. As the weight changes, the game changes with it. The speed of the ball and the way it moves will be the biggest factor of the weighted ball. This can determine the difference between an out and a base-hit. The faster speed can make the ball jump of the bat farther and carry and the more weight can make the ball dull off the bat and not soar in the sky. It all depends on how the ball will be affected by the weight. Will the speeds change? Will the movement patterns of the ball be different? This study will hopefully lead to a solid conclusion on what changes to be worried about when you aren't in the normal playing conditions.

903. HOW DO COMPRESSION SLEEVES AFFECT THE SHOOTING PERCENTAGE OF BASKETBALL PLAYERS?

Grant DiGrazio, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. David Werner and Dr. John Wnek

Compression sleeves in basketball have become a popular, new trend in recent years. These compression sleeves have been very controversial among athletes, analytics, and students of the game. It was relatively unknown how the compression sleeve affected the shooting percentage of basketball players. To test the sleeve's effectiveness, an experiment was conducted, in which well experienced participants shot with and without the compression sleeve for three individual trials. For each trial, the participants shot from the free throw line, a 15 foot shot, 10 times. The results from the experiment did not conclusively show that a compression sleeve increased the performance and shooting percentage of the basketball players. In fact, the compression sleeve was not only ineffective, but also proved to be detrimental to most of the basketball players' shooting percentage. The conclusion was made that compression sleeves should not be worn in order for basketball players to achieve peak performance.

904. ARE CARBS OR PROTEIN THE KEY TO FAST SWIMMING?

Anna Francisco, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

Carbohydrates and proteins are essential in an athlete's diet. This project was conducted to find if carbohydrates or protein are better to eat before a swim race. The hypothesis was that carbohydrates were more beneficial for optimal performance because they create glucose. On the morning of the first day of a swim meet, subjects were given a Balance protein bar to eat. On the second day of a swim meet, subjects were provided with a bagel to eat for breakfast. To determine how efficient each food was in helping the swimmer, the times swam in that meet were compared to the swimmer's personal best times before the meet. Results concluded that, though the day swimmers ate carbs they swam on average 2.13% slower, the swims were faster than the 2.70% slower proteins made the swimmers swim.

SPORTS – PHYSIOLOGY AND FUNCTIONS (CONTINUED):

905. IS THERE A DIFFERENCE BETWEEN THE HYPERVENOM PHELON FG AND MERCURIAL VAPOR IX FG CLEATS?

E. Stephen Hudak, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

Soccer players want cleats that will make their skills superior to those of their opponents. This research experiment was conducted to determine if two of the most popular Nike cleats contribute to a difference in performance among players. The two cleats tested were the Hypervenom Phelon FG and the Mercurial Vapor IX FG. The testing conducted to determine if there was a performance difference included many in-game soccer situations. Four subjects were made to wear both pairs of cleats and participate in a number of tests. These tests included: a 20 yard linear run, a 21 yard zig-zag run, and an 18 yard shot on goal for which the speed of the kick was measured. Although the Hypervenoms did make the player run faster in both the linear and zig-zag tests, there was not a significant difference in the shot travel time. However, there was not a great enough statistic significant difference between the comparisons of the cleats' performances to determine that one was superior over the other. The Hypervenoms and Mercurials did not make a significant difference in the player's performance, but the Hypervenoms did outperform the Mercurials in the running speed tests. The shot travel times varied as certain participants kicked harder than others; shot location varied, and shot trajectory also varied. Thus, neither cleat helped excel shot travel speed.

906. MLB PARK FACTORS: HOW TO DETERMINE WHICH STADIUMS FAVOR PITCHERS AND HITTERS THE MOST

Allie Immerso, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Dr. John Wnek

Every Major League Baseball (MLB) stadium has its own unique features, which causes players to perform differently at each stadium. Park factors based off of hits determine which stadiums are better for hitters, and which favor the pitcher. A park factor calculation that is greater than 1.000 means that the stadium is advantageous for the hitter, and a calculation that is less than 1.000 is beneficial to the pitcher. To determine which stadium is the best for a hitter, and which one is the best for a pitcher, park factors for each MLB stadium were collected over twelve years. Each stadium's overall average was calculated, and the most hitter and pitcher friendly stadiums were found. It was concluded that Coors Field in Denver, Colorado is the best ballpark for getting hits, and Petco Park in San Diego, California favors the pitcher the most. Coors Field had an average park factor of 1.186, and Petco Park had a park factor of 0.890.

907. HOW DO THE FORCES OF MALES AND FEMALES COMPARE TO EACH OTHER OVER DIFFERENT HEIGHTS IN HIGH JUMP?

Hallie Lazaro, Block 1 Science Class, Marine Academy of Technology and Environmental Sciences (MATES),
Advisors: Mr. Jason Kelsey and Dr. John Wnek

High Jump has been a field event in track for centuries. The technique for jumping over the bar has evolved throughout the years and eventually settled with the Fosbury-flop. It is considered the best and most efficient was to jump over the bar. The technique requires as fast run up and an explosive jump. This therefore causes the athlete to exert a lot of force. The study focused on the amount of force exerted between the two genders at different heights. The force was calculated by measuring the final ground contact in seconds as an athlete runs in to jump over several heights. The study showed an average final ground contact time for each gender, this was used to calculate the force. The results suggest that males exert more force than females when going over the same height. This could be because the final ground contact time for the males was faster, indicating a faster run in. Males are also heavier and have a higher muscle mass, even though muscle mass was not accounted in this study, than females. Females exerted less force because they are lighter and have a slower final ground contact. This study could guide athletes to how fast they should run in and how strong their final jump should be in high jump.

SPORTS – PHYSIOLOGY AND FUNCTIONS (CONTINUED):

908. BEST ANGLES FOR SOCCER PLAYERS TO SHOOT FROM

Olivia Montanha, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Dave Werner

Soccer is a very popular, internationally-known sport. In order to win the game, a ball must be shot into a net. There are many different angles that the ball can be shot from, but there are a main 5. A 0° angle is straight in front of the goal. It is the most direct angle and therefore the easiest to score from and has the highest scoring percentage. The two 45° angles are from the middle of the goal and can be drawn as lines through the top corners of the penalty box. These angles are moderately easy to score from and have about a 50% success rate. The most difficult angles to shoot from are the 90° angles. These are directly on the end line on each side of the goal. In order to score from these angles it takes a large amount of skill; the ball must be curved out and around the near post. Clearly displayed, the most ideal angle for a soccer player to shoot from is a 0° angle.

909. THE EFFECTS OF THE LENGTH OF WARM-UP ON A SWIMMER'S PERFORMANCE

Alexandria Raab, Block1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

The term warm-up refers to the physical activity that is performed before a meet, game, etc. to prevent injury and to ready the body for intense physical activity. Warm-ups are very important and finding the right distance of a warm-up is key; swimmers do not want to be too tired before their race from an extremely long warm-up, but they do not want to have too short of a warm-up and feel unprepared for their race. This study was conducted during the fall of 2013 at The Atlantic Club in Manasquan, New Jersey, to determine whether a shorter warm-up or longer warm-up enhances a swimmer's performance more; evaluating the females' times, males' times, and the two types of warm-ups overall. The results of this study suggest that there is a correlation between long and short warm-ups, a correlation between male long and short warm-ups, and a correlation between female long and short warm-ups. This study's results helped this particular group of swimmers decide which length of warm-up enhanced their performance more and could be used as a model for other swim teams.

ZOOLOGY:

1101. WHAT KINDS OF SOUNDS DO FISH HAVE THE GREATEST REACTION TO?

Nicole Crockett, Block 4 Chemistry, Marine Academy of Technology and Environmental Science (MATES)
Advisors: Mr. David Werner and Dr. John Wnek

A fish uses their otoliths and their lateral lines to hear sounds underwater. The objective of this experiment is to find out what kinds of sounds fish react to the most while they are underwater. It is hypothesized that fish can hear lower noises better underwater. Fifteen different mummichogs (*Fundulus heteroclitus*) were put into a small tank. Sounds with frequencies ranging from 20 to 1000 Hz were played in the tank. All of the fish moved faster when high pitched noises were played. In addition, as the frequency increased, there was a greater variation of reactions. Sharks and other cartilaginous fishes have no swim bladder, and can only hear low pitched noises. The mummichog has a swim bladder; they have a greater range of hearing, and also hear high pitched noises easily.

ZOOLOGY (CONTINUED):

1102. BIRDS ATTRACTION TO COLOR?

Reno D'Agostini, Block 3 Science Class, Marine Academy of Technology and Environmental Sciences (MATES),
Advisors: Mr. Jason Kelsey and Dr. John Wnek

Birds of all sorts are known to have better eyesight than any human ever known. This is because unlike humans birds have tetra-chromatic vision, which means that birds can see in a fourth spectrum of light. This type of vision is otherwise known as ultraviolet sight. Ultraviolet sight gets the name because instead of being able to see "visible colors" that are red, blue, and green, birds of all sorts can see violet light as well as the other colors. The real question; however, is how does being able to see a fourth spectrum of light affect the birds' natural habits such as eating? To experiment with these two bird feeders were painted two different colors one green, and the other yellow. The two bird feeders were then hung in similar conditions on a porch like environment. The experiment consisted of attempting to observe whether the birds were attracted to a deep green, or a very vibrant yellow. The results of this experiment show that the birds were in fact more attracted to the green bird feeder, and were least attracted to the yellow bird feeder. This study can further lead into the study of ultraviolet vision and the study of bird's behavior all together.

1103. HOW DOES SALINITY AFFECT THE REGENERATION OF SEA STARS?

Clayton Mann, Block 4 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Werner and Dr. Wnek

Sea stars are able to regenerate lost parts of their bodies, allowing arms and limbs to be lost and regenerated over time. Sea stars can regenerate, this is a known fact, but does the salinity of the water which the sea stars are in have any effect on the rates at which they regenerate? To come to a conclusion, sea stars were brought into small (3 gallon) tanks and acclimated to a certain salinity. There were three sea stars (*Asterias forbesi* and *Protoreaster nodosus*), each put into a tank with a different salinity, the first tank with around 10 ppt salinity, the second with around 25 ppt salinity and the third with around 41 ppt salinity. From here, the sea stars each had a limb amputated up to the central disk of the star. After a couple days, all three were deceased. The experiment was attempted again with *Protoreaster nodosus* instead of *Asterias forbesi*. Again, within days, all of the sea stars were deceased. Because of this, no conclusion could be reached.

1104. HOW DOES ELECTROFISHING IMPACT THE SMALLER FISH SPECIES?

Justin Reuter, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisors: Mr. David Werner and Dr. John Wnek

Electrofishing is a common and effective method for sampling and monitoring populations of fish in streams and lakes, as well as relocating fish populations when necessary. Electrofishing uses controlled electricity in water to shock fish and immobilize them in order to easily catch them. It is a relatively harmless process if used appropriately, but numerous studies have investigated the potential harmful effects of electrofishing on targeted species. However, few studies have explored the possibility of injuring or killing the smaller fish that may not be targeted by electrofishers. In this study, a wide range of previously performed research was utilized, along with field experience from a principle fisheries biologist from the New Jersey Division of Fish and Wildlife, to correlate fish size and the probability of injury or mortality from electrofishing. The results of this research explained how size is a key factor, and also explained how smaller fish are less susceptible to electric shock. It was also noted that total power transferred to the fish increased with fish size. This shows that electrofishing would probably not put the smaller fish species at risk, at the commonly used electrofishing settings.

ZOOLOGY (CONTINUED):

1105. WILL EARTHWORMS IMPROVE FERTILITY OF HURRICANE SANDY SOIL?

Molly Robinson, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Dr. John Wnek

Hurricane Sandy was a tragedy that upset the balance of the ecosystem. Along with ruined habitats for animals and people alike, soil was displaced and contaminated with debris. To improve fertility, earthworms were placed in the soil to see if they would have an effect. 12 worms were placed in 3 buckets of Hurricane Sandy soil and 1 bucket of control soil. Over the course of 5 weeks, the change in the fertility was observed. Contrary to the hypothesis, the conditions of the soil did not improve. The nitrogen, phosphorus, potash, and pH levels stayed mostly consistent. The worms in buckets 1 and 2 were all dead within the first 2 weeks. The worms in bucket 3 were dead within 4 weeks. In the control, the fertility of the soil did improve and all worms lived. Some factors that could have influenced this outcome are the salinity of the soil and the composition of the soil. Too much salt from the bay water could have caused the worms to die and unknown substances that the floodwaters washed into the ground also could have caused the death of the worms.

1106. WHAT IS THE EFFECT OF WATER TEMPERATURE ON CLAM BURROWING BEHAVIOR?

Olivia Schailey, Block 1 Science Class, Marine Academy of Technology and Environmental Sciences (MATES),
Advisors: Mr. David Werner and Dr. John Wnek

Quahogs (*Mercenaria mercenaria*) are farmed and gathered all along the U.S. east coast annually. Clamming is a million dollar industry with so little knowledge on how they behave. It is known how most clams use an internal structure called a foot to dig under the sand, but there is limited knowledge on how they act after they are underneath the surface. Most people know when clamming a relative idea of how far they have to dig down looking for the clams before moving on to the next spot, although this project is aiming to determine further knowledge on just how accurate these speculations are. It is hypothesized according to previous knowledge and common sense that the clams would burrow deepest under the sand resembling hibernation in the cold temperatures. The experiment divided clams into groups of 50 and had each group experience a different temperature resembling the winter, fall, and summer temperatures. This was done three times. It was difficult to determine if the clams would respond normally to being in a contained environment, and if they did how accurate these results may be. The results were gathered every five days and were analyzed. Each experiment showed that when the clams were placed in the warmest water tank they burrowed deeper underneath the sand than in the colder tanks.

GRADE 10 PROJECTS:

1201. WHICH IS MORE EFFECTIVE: TRADITIONAL CHEMICAL CLEANING PRODUCTS OR HOMEMADE NATURAL PRODUCTS?

Helene Brochon, Block 3 Science Class, Marine Academy of Technology and Environmental Science (MATES),
Advisor: Mr. Jason Kelsey

A certain issue that has been mildly disputed in the past few years is what type of cleaning product to use within your household. Some say that traditional store-bought cleaners are more effective for killing more bacteria. However, others say that these store-bought cleaners are harmful to the environment and to your house, and that a natural homemade alternative is much safer for a common household. It's obvious that the homemade product is healthier to the environment, but which is more effective in killing bacteria? To test this, multiple samples of bacteria were taken from a household kitchen sink and cultured in petri dishes. Half of these bacteria colonies were then sprayed with a natural homemade cleaner consisting of vinegar, and the other half were sprayed with Windex. The amount of bacteria colonies killed will be recorded and analyzed to determine which cleaning product is more effective in killing bacteria.

GRADE 10 PROJECTS (CONTINUED):

1202. WHAT LIES WITHIN THE UNCANNY VALLEY?

Charles Capone-Buchanan, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Jason Kelsey

In robotics and CGI there lays two theoretical “mountains”; on one mountain there is a robot or CGI that looks exactly like a human and another mountain where a robot or CGI may be recognized as humanoid, but is never mistaken for an actual person. In-between these mountains lies a theoretical “valley” where a robot or CGI looks and can sometimes be mistaken for a human but does not meet all the requirements to be a “human” in a person’s mind and as a result appears unnerving; the uncanny valley. The question is, however, are the images that fall into this valley actually unsettling to everyone or does the “creepiness” depend on the person and his/her perspective on what creepiness and human-likeness is. To test this, ten individuals where shown images, that supposedly fell into the uncanny valley, and where asked how humanlike and unsettling the images where. According to the results, the ten individuals showed inconsistent results amongst each other; however ratings between each of their own pictures showed a significant patterns and consistency.

1203. ANALYSIS OF ESTUARINE SPECIES IN BARNEGAT BAY WITHIN DEVELOPED AND NON-DEVELOPED HABITATS

Matthew Dixon, Block 2 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Dave Werner

Greater species diversity ensures natural sustainability for all life forms. Within estuaries, like Barnegat Bay, there are increased anthropogenic impacts including urban runoff, excess nutrient inputs and direct loss of habitat. Estuarine habitats are crucial to the survival of species as it has a nursery function. The question is “do these impacts cause a change in pH, water temperatures and salt values in developed areas versus non-developed areas?” Is the biodiversity of species in Barnegat Bay affected by changes in these factors? A sampling location in a developed area and undeveloped area was analyzed for biodiversity of species, water temperature, pH and salinity throughout the months of September and October 2014 during incoming tidal events. Species were collected using a standard seine net. A Jaccard’s Index was calculated to determine similarity of species in disturbed versus non-disturbed areas. As the water temperature decreased through the seasonal change the species biodiversity was reduced. The developed area also resulted in lower species diversity. This study will provide better insight into species that can be considered “habitat generalists” which will have important implications for possible, future species dominance in Barnegat Bay.

1204. EFFECTS OF AGE AND GENDER ON COLOR ATTRACTION

Joshua Greenberg, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Jason Kelsey

This experiment was completed in order to ascertain which colors give off the most attraction and pull the most attention to the eye. In order to pursue this experiment, it should be tackled in a survey-like manner. The way to do this is: to prepare a variety of colors for the respondents to the survey, place each respondent in front of these colors, and see which color each person looks at first. It is necessary to collect the data for gender, age, and color picked for each person that is surveyed. This will tell you how genders and ages have an effect on how all of the participants are attracted to different colors, and to what colors draw their attention. A difficulty to consider is where the colors are placed when the survey is taken because the person may pick the color sitting right in front of them. To avoid this, the colors could always be placed in a random order, preventing bias. I anticipate for this experiment to produce favorable results, and also results that indicate only a few colors as most eye-catching. In the end, I hope to be able to explain which colors are most attractive, and why these colors are most attractive.

GRADE 10 PROJECTS (CONTINUED):

1205. DOES PLAYING VIDEO GAMES IMPROVE REACTION TIME?

Thomas Kaunzinger, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Mr. Jason Kelsey

Video games are a common pastime among many children, teenagers, and adults. For quite some time, now, many people have believed that playing these games more frequently would result in an improvement of average reaction speed. Their reasoning is usually because either the games themselves require the players to react quickly, or just because they are concentrating harder than normal. But does this prove to actually be true? After constructing a ruler drop test to several individuals, from mixed age groups, and then having them describe their play time on a scale from 1 to 3 on their frequency of playing. The test was conducted by having the test subjects hold a ruler at 0 centimeters, dropping it at a random time, and recording the distance from 0, when they caught it. I then used those distances to calculate the time it took to catch. I repeated this three times and found the mean time to use. From looking at the average speed versus the frequency of playing, I have concluded that this hypothesis is actually true. The people who ranked 3 performed quite a bit better than those who ranked 2. They performed also a bit better than those in the 1st rank. So, in the end, playing video games does in fact improve reaction time.

1206. EFFECTS OF COPPER SULFATE VS. CUPRAMINE™ ON REEF ORGANISMS

Christian Smith, Block 1 Science Class, Marine Academy of Technology and Environmental Science (MATES), Advisor: Dr. John Wnek

Copper sulfate (CuSO_4) is a chemical compound used in controlled marine environments in order to treat the system for parasites and to prevent algae from growing. Cupramine™ is a buffered copper solution that is regarded as being more reef-safe than copper sulfate, but is this really the case? An experiment was conducted in order to prove or disprove the claim. Snails and duckweed leaves were placed in several containers that each had a different concentration of copper sulfate. Another container held a recommended dose of Cupramine™. The amount of organisms that were alive was recorded at the end of each day for five consecutive days. The results showed that the organisms withstood the copper sulfate solutions more than the Cupramine™ solution. Data from the experiment disproved the claim that Cupramine™ treatments are more reef-safe than copper sulfate treatments.

1207. IS IT POSSIBLE TO TRAIN FISH TO FEED IN RESPONSE TO SOUND?

Joshua Thomas, Block 1 Science Class, Marine Academy of Technology and Environmental Sciences (MATES), Advisor: Mr. Jason Kelsey

The experiment created was used to answer the question: Is it possible to train fish to feed in response to sound? The experiment was inspired by the experiments conducted by Ivan Pavlov. During his experiments he exposed dogs to a ringing bell and measured their salivation. This experiment uses the same principles of conditioned and unconditioned responses and stimuli. Fish were the subjects of this experiment and twice a day for forty days when they were fed a Snapple cap was snapped three times, the unconditioned stimuli, and the time it took them to feed after the sound was played, the unconditioned response. The goal of this experiment was change the fishes' unconditioned stimulus, the Snapple cap, into a conditioned stimulus and to reduce the value of the unconditioned responses, the times. The results of this experiment showed a slight negative correlation between the times and date. This was the expected result and is interpreted that the experiment was successful in training the fish to respond to the sound of a snapping Snapple cap. In the terms of Pavlov the fish at the end of the experiment had a conditioned response to the conditioned stimulus.