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**North Carolina School of Science and Math
Durham, NC**

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Preface

The North Carolina Student Academy of Science Board of Directors is delighted to present the second issue of the NCSAS Proceedings. As we strive to provide more opportunities for students to participate in scientific research and to present their findings in an authentic way, the Proceedings fill a special niche. For most students the NCSAS Proceedings will be their very first foray into publishing and we hope to open their eyes to other possibilities for student publications. While the NCSAS routinely incorporates both written and oral presentations into our competition, the Abstract holds a special status in science. A well-written abstract is enormously powerful and a stringent exercise in clear and concise writing. We encourage students to craft their abstracts so that any reader can appreciate their contribution to science.

The NCSAS competition is designed to resemble, as much as possible, what professional researchers do. However, the NCSAS is unique among competitions in that it provides an opportunity for student presenters to converse with their judges over an informal dinner. We are very fortunate to be able to draw judges from the enormous pool of expertise available to us in academia, government, and industry and we are excited that we can bring students and scientists together in this way. The NCSAS consists of 9 Districts across the state and we are also fortunate to have a board of volunteer District Directors (teachers and university professors), who organize the District competitions where students can qualify for the state-level competition. And finally, we credit parents and teachers for nurturing young scientists and fostering their research skills.

Yours in research,

Amy L. Sheck, Ph.D.

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Preliminary Investigation of Caprine Learning and Memory.

Lydia Burcham

East Wilkes High, Ronda

This study examined the ability of five goats to learn through discrimination and observational learning. It also examined the goats' memory abilities. The purpose of the study was to gain further knowledge in the area of caprine learning. Performance on each task was compared in a single subject design. The goats learned to discriminate between a black bucket and a white bucket. The overall learning increased from 43% accuracy to 98% accuracy over the course of the eight sessions. The goats maintained a 90% accuracy rate in the discrimination test when examining long term memory from the learned tasks. The area of observational learning proved to be the highest level of skill for the goats tested. They began with an 87% success rate and were at a 100% success rate by the end of the testing sessions. These results indicate that caprines have a high capacity for learning and are certainly not deserving of the bad press they often receive.

The Impact of β Cyfluthrin and Imidacloprid on *C. elegans* & *Lumbriculus variegatus*.

Rohan Patel

Mallard Creek High, Charlotte

The experiment conducted attempted to assess the correlation between the concentration of an agricultural pesticide containing pesticides β Cyfluthrin and Imidacloprid and their impact on the circulatory and neurological functions of *Lumbriculus variegatus* and *Caenorhabditis elegans*. It was hypothesized that increased concentrations of the pesticide would result in lower pulsation. For *Lumbriculus variegatus*, reduced locomotion was expected. The pesticide was diluted to smaller concentrations. To properly sustain each of the species, water was used as the dilutant for *Lumbriculus variegatus*, and a buffer solution was used as the dilutant for *Caenorhabditis elegans*. *Lumbriculus variegatus* organisms extracted from a freshwater tank were placed in a Petri dish lined with filter paper via pipette. *Caenorhabditis elegans* organisms from a Petri dish with agar were taken with an inoculating loop to a small slide. Under a dissecting microscope, each organism was observed over a 30 second period to observe their behaviors and pulsation. This procedure was done with the organisms' dilutants alone to observe normal behaviors and pulsation as a control and with pesticides to observe differences. Perialistic crawling of *Lumbriculus variegatus* and general movement of both species was observed. For *Caenorhabditis elegans*, thrashing movements were used to record pulsation. Data showed that as pesticide concentration increased, pulsation, neurological response, and movement diminished. Pulse rates were as low as 8 per minute at concentrations of .39%. It was concluded that higher concentrations of pesticide resulted in lower pulsation and disability in neurological functions for both species.

Antibiotic Resistance Dissemination Increased by High Frequency of Conjugating Bacteria in *Escherichia coli* Populations.

Jennifer Wu

North Carolina School of Science and Mathematics, Durham

According to the World Health Organization, the total societal cost of antibiotic resistance amounts to over \$35 billion dollars per year in the United States alone when accounting for lost lives, wages, and extended hospital stays. Bacterial conjugation, a type of horizontal gene transfer, is one of the processes by which

antibiotic resistance is disseminated throughout a bacterial population. In the search for methods to inhibit the spread of antibiotic resistance, preventing bacterial conjugation is considered a promising target. However, the degree to which conjugation affects the rise of antibiotic resistance is unclear. This study investigated the effect of different ratios of conjugatory donors to recipients of *Escherichia coli* on the population's resistance to tetracycline. Strains BB4 and DH5 α served as the donor and recipient cultures respectively and were allowed to conjugate before being plated in tetracycline containing agar; resistance was quantified by colony density. Results showed that the presence of conjugating bacteria had a greater relative effect on colony density at higher tetracycline concentration. A donor percentage of 5% (1:19) more than doubled the minimum inhibitory concentration of tetracycline required. At a donor percentage of 20% (1:4), colony density approached levels of an entirely resistant population. This experiment has revealed that even at low levels, bacterial conjugation has the potential to rapidly increase the resistance of a bacterial population and presents conjugation as a crucial target for slowing the spread of antibiotic resistance.

Behavior of Novel Electrospun Scaffolds.

Amrita Malur

D. H. Conley High School, Greenville

Electrospinning is the process of applying an electrical charge to spin out fibers from a solution onto a surface. Along with the incorporation of cells, these electrospun scaffolds can aid the wound and tissue repair procedure. This study was undertaken to create and evaluate the scaffolds for future integration and study of cells within fibers. Scaffolds were composed of polyethylene oxide (PEO), beta lactoglobulin (BLG), and Rhodamine B (RHB), a fluorescent dye used to see the scaffold fibers under a microscope. The solution was spun for 24 hours. Afterwards, the scaffold was quartered and cross-linked by heat treatment in a 100° Celsius oven and each section was removed at predetermined time points. To test the durability of the scaffold, small circular sections of each quarter were cut and placed in standard cell culture media. The media was analyzed daily to evaluate Rhodamine B release from the scaffolds. High resolution images acquired using a confocal microscope showed that cross-linking had no significant effect on fiber diameters in the scaffolds. However, when analyzing scaffold degradation, there was a positive correlation between the length of crosslink time and the time for scaffolds to completely degrade in media. The Rhodamine B dye did elute from the mat, as expected. However, this did not appear to influence fiber structure. In the future, increasing electrospinning and cross-linking times will be evaluated to create a more stable scaffold design.

A comparison of the anticancer potential of extracts from *Trifolium pratense*, *Pueraria Lobata*, and *Plantago major*.

Erin Smith, Elizabeth Johnson, Cameron McCathern

Brevard High School, Brevard

The purpose of this experiment was to determine the possibility of using *Trifolium pratense* (Red Clover), *Pueraria lobata* (Kudzu Root) and *Plantago major* (Plantain leaf) as anticancer and antitumor drugs in the future. These plants have a history of being used in Native American and folk medicines as treatments for cancer and are commonly found in western North Carolina as well as all over the United States. Three tests were performed on the plants to confirm any anticancer properties. Brine shrimp assay tests for cytotoxicity; potato disk assay tests for antitumor properties; and photospectrometry to measure the level of antioxidants in the extracts. It was determined that small amounts of each of the extracts kill

the majority of brine shrimp when introduced to the container. *T. pratense* and *P. lobata* both inhibited tumors consistently throughout the trials and all three plants were shown to contain significant amounts of antioxidants. These results support that *T. pratense*, *P. lobata*, and *P. major* are all plants that could be used for anticancer research in the future.

Help is on the Way: Engineering a System to Deliver Smoke Masks to the Second Stories of Burning Buildings.

Chase Lewis

Home Schooler, Orange County

Forty percent of the 2500 people killed by home structure fires each year in America die from smoke inhalation when firemen cannot reach them in time. The goal of this project was to create a way to give people trapped in the upper stories of burning buildings additional time to wait for firemen. If a projectile containing a smoke mask could be thrown or launched into the upper levels of burning buildings (primarily 2nd floor) by first responders, many deaths due to smoke inhalation could be prevented.

A commercial pneumatic launcher was tested to send different projectile containers into upper story-windows. After the launcher failed to put a single projectile into the window from 45 feet away, the volunteer testing the launcher threw the canister through the window on the first two attempts, in stark contrast to the launcher's failure. Research on thrown projectiles was then initiated. Several hand-thrown projectile containers were developed and tested. The prototypes included a 3D-printed football design, stick grenade and simple canister. The projectiles were thrown from three distances (10, 17, and 25 feet), by 37 testers, into a mobile testing unit that replicated an open double-hung window on a second story. The most accurate container, on average, was the 3D-printed football. Its small collision cross-section, gyroscopic stabilization, and a natural and well known way of throwing all contributed to an efficient, simple and easy to use device.

Construction of a Generic MAV and Evaluation of Unhinged Flaps on Landing Distance.

William Jordan

Avery County High, Newland

This study was conducted to recreate a Generic micro aerial vehicle (MAV) from basic data specified in an Air Force research report, and to conduct various tests using the vehicle. Short takeoff and landing capabilities for MAVs are increasingly more important, as these vehicles are being launched in areas without an airstrip more frequently. Therefore, the effect of hinge-less flaps upon landing distance was the first test to be conducted and has been the only experiment to this date because of time constraints. Hinge-less flaps were hypothesized to allow short landing capabilities without requiring a drastic modification to the aircraft. The aircraft was constructed from available materials, including sheet foam and carbon fiber rods, in contrast to the molded carbon fiber of the original design. The aircraft was equipped with servos and a motor, and was remotely piloted for the testing process, in which landing distance and descent angle were measured. The results indicated that the hinge-less flaps reduced landing distance and increased descent angle slightly, indicating a correct hypothesis, but further study will be required to validate these results.

Determining Seasonal Correlation of Phytoplankton Variation with Phosphate Concentration in the East and West Sides of Lake Mattamuskeet.

Anne Blythe Davis

Lake Comfort School, Swan Quarter

This experiment was designed to determine the existence of seasonal correlation of phytoplankton variation with phosphate concentration in the east and west sides of Lake Mattamuskeet on Mattamuskeet National Wildlife Refuge. On two days in the spring and summer of 2013, 15 water samples were taken from randomly-chosen locations on each side of the lake and five locations at the lake's dividing highway culverts during the summer, tested for phosphate concentration, and preserved. Water from each sample was examined under a light microscope using a Wipple grid and phytoplankton were counted and identified. The data did not support the portion of the hypothesis stating that phytoplankton concentrations would increase with increasing phosphate concentrations, however, the data did partially support the portions of the hypothesis stating that there would be significant variation in phytoplankton composition between the two sides of the lake for spring and summer samples. This could be due to the presence of a limiting nutrient other than phosphate in the lake water that more directly affected phytoplankton concentrations. This information will be useful to limnologists and biologists interested in managing cyanobacteria loads in freshwater lakes. Specifically, it will be useful to managers at Mattamuskeet National Wildlife Refuge as they consider various approaches to improve the water quality of Lake Mattamuskeet.

Environmental Effects on Rates of Decomposition in Crickets.

Stephanie Powell

The question I asked was, "Do crickets decompose faster in the light or the dark, comparing multiple environments?" My hypothesis was that the crickets in the dark would decompose faster than the crickets in the light. I created six different environments in mason jars: sand, water, grass, rock, dirt, and potting soil. Then, I duplicated each environment so I had two of each and 12 mason jars total. I then put one live and one dead cricket in each mason jar and put one of each kind of mason jar in an area that gets natural light and the remaining six in an area that gets no light. I recorded their progress through pictures and a log. At the end of the experiment the crickets in the area of no light had more advanced decomposition than the crickets in the area that gets light. In my hypothesis I stated that the crickets in the dark would decompose faster than the crickets in the light which thought this experiment was proven correct.

Growing Beans.

Emily Geouque

Blowing Rock School, Blowing Rock

The purpose of this experiment was to see if a plant watered with water would grow faster than a plant watered with something sugary. Pinto beans were planted two inches deep then watered weekly with three tablespoons of water, coke or sweet tea. Height data was collected weekly.

The plant watered with water grew and the plants watered with sugary liquids did not. Between the first and second week, the plant watered with water germinated. When it was measured on week two, it was 1.5 centimeters tall. The plant watered with water grew the most between week two and week three. It grew twenty centimeters. The next few weeks the plant's growth slowed but the plant still grew a few

centimeters. A trend in this plant's growth was that it grew a few centimeters the first few weeks, a lot in the middle and less in the last few weeks. During week three, small leaves were noticeable on the plant. The plant continued to grow during the following weeks. Around week five, two of the plant's leaves turned yellow. The plants watered with coke and sweet tea had a trend in common: they did not grow at all and smelled bad. Around week five, mold grew around those plants. The experiment showed that plants watered with water grow and plants watered with sugary liquids rot instead.

Photo Lineups.

Keilah Bowman and Lauren Stamey

Avery Middle School, Newland

The main question being asked was: "How well do photo lineups work?" To answer this question, my partner and I got a group of actors to act out a crime scene. After rehearsing for a couple of weeks, we started filming. Afterward, we showed the video to three classes and asked the students to state who they thought committed the crime. Our hypothesis was that 15% of the 20 people we showed the video to would get their guess right, choosing subject three (which was correct). Our results were that the students we showed the video to guessed subject three the most. 50% of the twenty people we showed the video to guessed that the right suspect committed the crime.

An informative study on the effects of Monosodium Glutamate on blood sugar in adults.

Sarah Shepherd

I chose to test this experiment because it relates directly to me and people close to me. Also, the career path I have chosen for my future branches from this topic. The purpose of my project was to find the short-term effects on blood sugar in diabetics. These findings could help diabetics learn better eating habits so that they can live healthier lives in the future. For my project, I tested my subjects' blood sugar while they fasted and after eating a casserole with no MSG. I tested blood sugar again 2 hours later, waited 2 days, and did it all over again. I began this project because I thought that if my hypothesis was correct that it may greatly change the future. Knowing what MSG does to the blood sugar could cause the diabetic population to be less and less dependent on insulin, potentially to the point where it isn't needed at all. This can all be discovered to simplify the everyday diabetic life, by changing easy dietary habits. With Type 1 Diabetes, the insulin in the blood must be supplemented with shots. People with Type 2 Diabetes will benefit most from any discoveries made in this project. Once the benefits for Type 2 are fully utilized, the benefits for Type 1 will soon abound. If I were to continue this project, I would increase my sample size and I would contrast the results found in adults to the results found in younger and/or older people.

Vehicular Carbon Dioxide Emissions.

Navami Jain

Metrolina Regional Scholars Academy, Charlotte

The study was a continuation of a previous project that demonstrated that caloric restriction would increase longevity using *Drosophila melanogaster* fruit flies. The purpose of this study was to expand the experimentation with more than one food source and fly species, and to determine if the increase in longevity was due to an epigenetic mechanism. The hypothesis was that lifespan extension with calorically reduced food formulas would be demonstrated, and that the increase in lifespan would be

passed down to the next generation due to an epigenetic mechanism.

The first generation of *Drosophila melanogaster*, *hydei*, and *virilis* were cultured using three different food formulations with both full and reduced caloric contents. The second generation of the flies received food formulas with full caloric contents.

First generation *Drosophila* flies cultured on calorically reduced food mediums demonstrated an average 29.4% increase in lifespan. When offspring flies of the parent generation that had received calorically reduced food were cultured with non-calorically reduced food, the offspring still demonstrated a 27.2% increase in lifespan.

The hypothesis for the project proved to be correct. This continuation project demonstrated increased longevity in the parent generations of three different species of fruit flies using three different food formulas. Because the offspring of the parent flies received food containing full caloric contents and still demonstrated increased longevity compared to the control group offspring, the hypothesis that increased lifespan was due to an epigenetic mechanism was proven correct.

Potato Power.

Nathaniel Hardy

Homeschooler, Avery County

My purpose was to try to find a plausible and affordable way to create power because many countries do not have electricity to power their homes, and almost all slightly acidic fruits, vegetables, or even dirt or waste products have the ability to generate electricity. In order to find the potato with the most energy, I experimented with three different types of potatoes. My procedure consisted of placing the electrodes in the potato, measuring the output voltage of the raw potato, boiling each potato, weighing each one, and then measuring the output voltage of boiled potato. My results were that the unboiled red potato generated the most electricity: 0.4 volts per ounce. The white potato generated 0.1 volts per ounce, while the sweet potato generated the least power. This data means that approximately three red potatoes of this size can power an LED cheaply. These results show that potatoes could be used as a way to generate power in rural areas without electricity.

Bio-Ethanol for a Sustainable Tomorrow.

Elijah Eugene Shuford

Hope Middle School, Greenville

Ethanol is a renewable fuel made from various plants known as biomass. Ethanol is also alcohol-based and can be produced through the fermentation and distillation of starches (ex. corn) or sugars. Studies have predicted that ethanol and other biofuels will replace up to 30% or more of the United States' demand for gasoline by 2030. Even though corn is one of the main sources used in the production of ethanol, other alternatives are currently being researched. These alternative starches include cassava and arrowroot. In the experiment I conducted, I hydrolyzed, fermented, and distilled three different starch-based feedstocks (cassava powder, arrowroot powder, and white corn powder) to produce ethanol. I also conducted the Benedict's test, iodine test, flame test, and ethanol test. I wanted to determine which starch yields the most ethanol by volume and which hydrolysis compound (Fenton's reagent, citric acid, or Beano or alpha-galactosidase) yields the most ethanol by volume. A t-test was performed and p-values were recorded to determine statistical significance. The results showed that arrowroot starch yielded more ethanol than the cassava and white corn starches. The results also showed that Beano worked the best

as a hydrolysis agent because, on average, it produced more ethanol than the Fenton's Reagent and citric acid. I also conducted a cost analysis which showed that the most economical way to produce ethanol using a hydrolysis agent would be with Fenton's Reagent. However, while using Fenton's Reagent is cheaper, using Beano may be less time consuming and yield more ethanol. This experiment also serves as a way to relieve the world's dependency on oil and fossil fuels through the extraction of bio-ethanol from organic substances. The goal is to make as much ethanol as possible while keeping the cost of production low. Finding alternative starch sources for bioethanol production is key to keeping ethanol production costs down. This experiment shows that there are alternatives to corn in bioethanol production.

Which Grade of Gasoline Runs the Longest?

Andrew Tilley

Millenium Charter Academy, Mt Airy

My project's purpose was to find out if the octane in gasoline affected how long gasoline burned. I chose to do this because I love to work on cars and ride go-karts and dirtbikes. During my research, I found that the purpose of octane was to resist knocking, when gasoline explodes before being hit by a spark from the spark plug, in your engine. During my experiment, I found that the higher octane gasoline burned the longest, supporting my hypothesis. Although the higher octane burned longer, the midgrade gasoline was the most cost efficient.

How Does Ethanol Affect the Running Temperature of a Small, Four-Stroke Engine?

Jack Bevard

Millenium Charter Academy, Mt Airy

The purpose of my science project was to find out if I needed to use more expensive fuels for my older vehicles. I did this experiment because my lawn mower engine was sputtering and not running very well. Ethanol supposedly makes small, older engines run hotter. I decided to test the effect of ethanol on four different vehicles. The tests proved that my hypothesis was incorrect, because on three out of four vehicles, the ethanol caused the engines to run cooler. This could benefit people who buy the more expensive non-ethanol gas, because the temperature differences between the fuels were not significant.

EMF Radiation from Commonly Used Electronic Devices.

Samantha Boone

Mount Mourn School, Mooresville

The purpose of my experiment was to find out how much electromagnetic radiation (EMF) electronic devices emit. To find out how much EMF electronic devices emit, I first turned on the device being tested and then placed it 1 inch away from the TriField Meter Model 100XE (on the Magnetic 1-3 setting). Then I recorded the data displayed on meter. Lastly, I repeated these steps for each device being tested. I found that smartphones emit the most EMF radiation because smartphones operate on high frequencies. My hypothesis was proven to be correct. To improve my experiment, I could change the amount of tests conducted, and I could use a more sensitive EMF meter to measure the EMF radiation. I could also expand testing to include different types of smartphones, laptops, and tablets.

Water Treatment using Acoustic Cavitation.

Cassidy Brandt

Northview IB Middle School, Statesville

The purpose of my experiment was to test if acoustic cavitation could break apart contamination in water and clean the water. First, I built a cavitation chamber. Then, I ran tests to find the power and sound frequency required to cause acoustic cavitation. Once these levels were found, I added a contaminant (propylene glycol based food coloring) to water samples, then applied acoustic cavitation for a period of time. I collected time-lapse samples to see if the contamination concentration decreased. Next, I visually compared the samples to the control and baseline samples. I then used a spectrophotometer to find Chemical Oxygen Demand to see how much contamination remained and compare the results to the control and baseline samples. I found that the contamination levels decreased 32% and 44% at 56 minutes and 120 minutes, respectively, for the first sample. For the second sample, I found that the contamination levels decreased 29% and 41% at 56 minutes and 120 minutes, respectively. Therefore, acoustic cavitation did destroy contamination dissolved in water.

Comparison of water collection efficiency between hydrophilic and hydrophobic surfaces.

Jenny Lee

Guy B. Phillips Middle School, Chapel Hill

Water collection efficiency for hydrophilic and hydrophobic surfaces was examined in this research. Slide glasses with and without oil paint coating were examined for hydrophobicity of the surfaces. The water was dropped on the surface using a syringe with 20 – 100 ul. The angle of the water drop to the surface was to be 89.4 degrees for oil painted glass and 39.5 degrees for glass without paint. The oil paint coating made the surface hydrophobic. To examine the water collection efficiency, a weather chamber was built. To imitate a desert morning breeze at dawn, the chamber was built with a fan and a cool mist humidifier. The chamber and the glass sample were cooled down using a metal can with ice cubes. Ice cubes were replaced every hour. The glass samples were cut into squares with side lengths of 1 inch and placed on the metal can facing the moist wind. The water that condensed on the surface was collected in a plastic bottle through a funnel. The temperature and the humidity were monitored using a thermo-hygrometer and a thermocouple. The water was collected at least three times for each sample for 30 min each. The wind speed at the sample was 4.9 m/second. The temperature was 19.2 C and the humidity was 42%. After the ice can was placed in the chamber, the temperature dropped to 13.7 C and the humidity became 99.6%. The average amount of water collected for 30 min at this condition was 16.1 mL for the glass surface and 13.8 mL for oil painted surface.

Catalyze the Future with Hydrogen Energy.

Simran Bhatia

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The purpose of this project was to determine how solar energy can be used and stored for when it is dark outside through the process of water electrolysis in the presence of a cheap and efficient catalyst. I performed an experiment where batteries were used as a substitute for solar panels as a source of electricity used to split water. Generating Hydrogen energy is a very new technology and the byproduct in this procedure is only water. Hydrogen energy is 90% efficient and is a zero-emission energy. As this

technology advances, the hydrogen generation process can be done using seawater and solar power. This may be used in the future because non-renewable energy resources are definite and emit greenhouse gases. Hydrogen energy would save a lot of money because it is a renewable and clean source of energy. The hypothesis for this project was “If a Cobalt base Catalyst is added in a renewable energy procedure by splitting water in to Hydrogen and Oxygen gas molecules, will it increase the efficiency of the procedure?”

To do this experiment, a Galvanostatic electrochemical cell was created with batteries and a breadboard. This cell was connected to a Voltmeter/Multimeter and two electrodes in a phosphate buffer solution on a stir plate. When Cobalt was added and the stir plate was turned on, the Voltmeter/Multimeter would give a voltage reading. Throughout the experiment Hydrogen and Oxygen gas molecules started forming on the cathode and anode, respectively. On a commercial level, the hydrogen and oxygen gas could be stored in separate tanks and be combusted in a fuel cell when it is dark. This way energy can be produced, stored and used more efficiently, when needed.

The results supported the hypothesis, as adding the catalyst proved to make the reaction more efficient by 9.1%. Before adding the catalyst, the efficiency was only 62.8%, and after adding the catalyst the efficiency changed to 71.9%. The project explains how Hydrogen Energy is better for human needs, the environment and for the economy.

A Shoreline at Stake: Effects of Marker Presence and Size on Shoreline Erosion.

Coleman Davis

Lake Comfort School, Swan Quarter

This project was designed to determine the effects of shoreline marker presence and size on shoreline erosion. Markers were placed on the Bell Island estuarine shoreline of Swanquarter National Wildlife Refuge and then monitored from August 2013 to January 2014. The shoreline directly behind the markers was examined to see how much it had eroded and what shape the erosion took. Statistical analysis showed that the data did not support the hypotheses and that the erosion markers affected the amount and shape of shoreline erosion. This information is useful to researchers who use markers to measure sea level rise and shoreline erosion.

Does Pressure Affect Weather?

Lindsay Alexander-Eitzman and Caroline Hoover

Blowing Rock School, Blowing Rock

How does pressure affect weather? Pressure is an indicator of upcoming changes in weather. Therefore, pressure does not directly change weather. The purpose of this experiment was to find a way to predict the weather by making a barometer. Using pressure and barometer readings, the weather was forecasted. Data from the barometer was compared with data from a local weather station. Then graphs and charts of pressure and weather were made. Changes in pressure were compared to changes in the weather. Results showed that high pressure signifies sunny weather. Low pressure indicates cloudy or stormy weather. Results might have been more accurate if the barometer was placed outside instead of inside. Data was also taken to determine if wind speed and wind direction changed along with barometric pressure. We found that when the pressure goes down, the wind speed goes up, indicating a change in the weather.