
Worthington Christian's Environmental Bio Club

News and Updates

January 2021

Issue #1

Written by Mrs. Wood

Our Mission:

To improve our school's
environmental literacy.

Our first meeting of the new Environmental Bio club was well attended with over 40 students! Since that first meeting, we have met every other Thursday during block lunch with increasing numbers. It is truly exciting to see the enthusiasm and drive of our members! This year's officers are led by a trio of Seniors, President Joshua Jeyandran, Vice-President Rena So, and Secretary Shelby Amrine.

Our first task was to complete a club logo. Sophomore Emma Rawls worked with her father, a graphic designer, to create our first ever club logo and it is AMAZING! Look for students sporting their t-shirts and sweatshirts with the new design.

Next, we implemented a school-wide paper recycling program. Partnering with Houses, each classroom decorated a recycling box. PLEASE TRY TO ONLY PUT IN PAPER PRODUCTS. Otherwise, we are cleaning out those boxes and it gets messy and gross! Next step is to start plastic recycling. More details to come once we can secure a designated plastics recycling bin.

This fall we experimented with a bird migration simulation to illustrate how and why we have lost over 30% of our bird populations. Students "migrated" through their schedules encountering various problems along the way.

Our big project is to create an outdoor classroom with a bird sanctuary, butterfly garden and experiment with vegetables.



Seniors Joshua Jeyandran and Rena So in the lab



Our first ever club logo, designed by Sophomore Emma Rawls.

Senior Spotlight, written by Rena So

Two seniors, Joshua Jeyandran and Rena So are partnering with faculty member Kelly Mikhail in an opportunity of a lifetime!

Stewart's wilt is a bacterial disease of maize (corn) caused by the bacterium *Pantoea stewartia*. The bacterium is transmitted by the Corn Flea Beetle vector. Once a maize plant is infected it will transmit the bacteria to its offspring, resulting in dried corn and crop loss for farmers. In partnership with the Department of Horticulture and Crop Science at The Ohio State University, we are researching the phenotypic effects of *Pantoea stewartia* in B73 maize plants. Our goal is to study how to activate advantageous genes that enable maize to resist the disease without the use of pesticides.

Utilizing a variety of inoculation methods, such as a microneedle derm roller to imitate the bite of a corn flea beetle, dipping the maize plant in bacterial solution, and vacuum infiltration which forces bacteria into the maize plant, we observe the phenotypic effects right after inoculation and post 24 hours. We then extract the interstitial fluid from each plant, seeking to prove each plant is indeed infected with bacteria. Using "hole punches" from each leaf, we send the leaf bits to OSU. At OSU, the leaves are "beat" into a fine pulp and then spun through a centrifuge. A centrifuge allows for the individual cellular components of the leaf to separate based on molecular weight. We then extract the bacteria, dilute it, and plate it. After an incubation period of 48 hours, the bacteria have colonized to a countable size. Once each dilution is counted, we calculate the estimated number of bacteria per milliliter which gives us the CFU (Colony Forming Unit) for each inoculation method.

With the CFU data, we are expanding our research to study quorum sensing. Quorum sensing is when bacteria restrict certain genes and are able to amplify favorable ones when at a high concentration. With our data, we hope to study why *Pantoea stewartia* restricts specific genes of maize plants associated with immunity, and how we could potentially genetically modify future maize plants.

Emma Rawls

Endangered Species Spotlight – the Vaquita

The world's most endangered marine mammal

The vaquita, whose name literally means “small cow” in Spanish, is the world's most endangered marine mammal, and it has sadly been on the brink of extinction ever since its discovery in 1958. According to the Whale and Dolphin Conservation Center, there were around 600 vaquitas in 1997, which drastically contrasts the current population of only about ten individuals being left on the planet, with 90% of the population being lost between 2011 and 2016. This small porpoise prefers to inhabit shallower waters and can be found in the northern part of the Gulf of California, also known as the Sea of Cortez.

MY SOURCES:

<https://www.worldwildlife.org/species/vaquita>
<https://us.whales.org/whales-dolphins/species-guide/vaquita/>

If anyone is lucky enough to spot one in their natural habitat, the adult vaquita has large dark rings around its eyes, and darkly colored strips that stretch from its mouth all the way to its pectoral fins, making them look extra smiley, while the calves are much darker in their coloration. Like other members of the cetacean family, a group of marine mammals consisting of whales, dolphins, and porpoises, the vaquita's diet includes fish, squid, and sometimes the occasional crab or lobster. Unfortunately, the steep decline of vaquitas is majorly due to gillnets, fishing nets which are hung vertically so that fish get trapped in them by their gills, meant for the illegal fishing of other species such as the totoaba, a fish whose swim bladders are in high demand for medicinal purposes in China. According to the World Wildlife Fund, “... nearly one out of every five vaquita get entangled and drowns in gillnets.”

Together, organizations such as CIRVA (the International Committee for the Recovery of the Vaquita), INAPESCA (National Fisheries Institute of Mexico), and WWF have been, and continue to, develop plans that allow for safer fishing methods and environments for the vaquita, such as banning gillnets in its native habitat. The time is now to help protect these precious creatures, and so if interested in doing one's part to help preserve them, donate to the World Wildlife Fund, or another organization that aids in the recovery of the magnificent vaquita.



<https://www.ecowatch.com/vaquita-on-brink-of-extinction-2233479187.html>

Anna Valentine

The Future of Transparent Solar Cells

Recently, on January 5, 2021, researchers presented their first transparent solar cell; a cell that harnesses sunlight to convert into power. For five years, scientists around the world have worked towards a carbon-free future which solar cells promise. Within the scientific community, solar energy has always been the best choice for most innovative ideas. It is known to be the most dependable and plentiful energy source on Earth. Throughout the years, solar energy has become cheaper, more efficient, and environmentally friendlier.

Kim Joondong, a professor for the Department of Electrical Engineering at Incheon National University in Korea, asks, “What if next-generation solar panels could be integrated to windows, buildings, or even mobile phone screens?” This could mean that these objects would become power sources. Finally, Professor Kim and his colleagues successfully altered the idea of transparent solar cells into a crucial new finding: capturing light and creating electricity. Their results of the cell's performance was “quite good” despite utilizing only a small portion of the light spectrum. Additionally, it was responsive in low light conditions. In a final experiment, they were even able to power a small motor. Professor Kim suggests, “While this innovative solar cell is still very much in its infancy, our results strongly suggest that further improvement is possible for transparent photovoltaics by optimizing the cell's optical and electrical properties.” Since it was successful, Professor Kim and his team hope to continually improve the solar cell's efficiency for future use. This exciting scientific discovery will open new doors for the world's future of clean energy.

Sources:

https://eurekalert.org/pub_releases/2020-11/inu-sc110220.php

https://www.researchgate.net/publication/273782416_Transparent_conductor-embedding_nanocones_for_selective_emitters_Optical_and_electrical_improvements_of_Si_solar_cells



<https://www.extremetech.com/extreme/188667-a-fully-transparent-solar-cell-that-could-make-every-window-and-screen-a-power-source>

INTERVIEW, by Emma Rawls

Over the past summer, I had the pleasure of speaking with a Pinniped (the group of marine mammals consisting of seals, sea lions, and walruses) Trainer at the Georgia Aquarium. As some know, my family and I are from Georgia, and so the Georgia Aquarium, which is one of the top aquariums in the world, is extremely special to me. I am incredibly lucky to have gotten to interview one of the talented trainers there, and so I wanted to share the educational and inspirational conversation that I got to have, Q & A style:

Q: What was it like to live and work in Australia?

A: I grew up in Australia and I was born in Sydney. I moved to the US in 2015 for some travel opportunities and then I moved full time to live here in 2016. Living in Australia is great! Australians are much more relaxed and friendly than Americans. It's a relaxed lifestyle and I lived near the beach so that was always super nice. The winters in Australia are pretty mild and summers are nice and warm.

Q: What was your college experience like at JCU?

A: College at JCU was so much fun. I went to JCU to study Marine Biology and Zoology at the Townsville Campus. Townsville is a 3-hour plane ride from where I grew up in Sydney. I didn't do any internships during college because I had to support myself through college. I worked nights at a nightclub and went to school during the day. On mid-term breaks and during the summer break I was working all the time to pay for school and living arrangements.

Q: Did you ever do any internships in college? If so, where, and was it a positive experience?

A: After I finished school, I did 2 internships at Dolphin Quest in Bermuda. They are one of the most interactive internship programs that I know of. Interns are able to work animals and get assigned behaviors and you really get to know the ins and the outs of the job. They have specific goals and help guide you on getting what you need to get a job. The only downside is that the internship is run on the island of Bermuda which you live and stay on the Island for anywhere between 4-9 months. You have to pay to stay, pay your living costs for the entire time you're there, and you don't get paid to intern. This is a huge financial responsibility that can be hard for some people. Paid internships are at Disney - the Seas, Miami Seaquarium, and Sea World. You can find a list of Job postings on American Association of Zoos and Aquariums (AZA) - www.aza.org or International Marine Animal Trainers (IMATA) imata.org. These two websites list jobs. They are a great reference for finding jobs and have great information, especially IMATA, about becoming a marine mammal trainer. You have to pay for access to the IMATA job board, but you can sign up as a student or an associate member.

Q: Is there anything that I could be doing now to better help me in the future, and to help me be as best prepared as I can for college, internships, and job interviews?

A: Getting SCUBA certified will be a huge help for you. Whenever you can get certified it helps, as SCUBA diving is part of animal habitat maintenance. Ensuring that you're swimming/are working on swimming skills is really important too. In order to land your first job, you'll have to do a swim test before you even get to the interview portion, and being a good swimmer can ensure you get an interview and help you stand out. Doing "trainer for a day" programs will not help you in the field. These programs are designed for people who want a taste of marine mammal training but putting it on your resume doesn't count for much when it comes to actually working in the field.

Q: What is it like to work at the Georgia Aquarium? Is it a positive environment?

A: Working in Georgia has been a great environment. Pre-corona in the sea lion department we did shows and encounters, so as a trainer you get to do a variety of different things during the day. For me personally it has been one of the more intense workplaces, as you're usually very busy because there is a lot to do.

Q: What is your favorite part of your job?

A: My favorite part of the job is seeing all the cute sea lions and teaching them cool things. Being able to build a relationship with the sea lions is cool as well!

Q: What does an average day look like for you as a Pinniped Trainer at the Georgia Aquarium?

A: An average day for a sea lion trainer looks like, coming in the morning, around 8am. We do a daily assessment of the animals; look over their body and make sure they have no cuts. Then we clean all the habitats with brushes and water. Then we will do a variety of different sessions throughout the day working on different training things such as husbandry or show behaviors. There are usually 8-10 sessions per day per animal and prior to the coronavirus we had 4 encounters per day in which different sea lions would participate in and we also had 7 shows per day that different sea lions were in. Then at the end of the day more cleaning, closing down the areas, cleaning buckets, the kitchen and the floors, everything that might get fishy throughout the day. Then we go home for the night around 6pm.

Q: I saw that you had worked with dolphins previously as well, so I was wondering how different it is to work with/train dolphins vs. working with/training Pinnipeds?

A: Dolphins and sea lions are quite different. With dolphins you are able to build a relationship with the animals. They learn to recognize different trainers and are motivated by different things, such as rub downs, toy play, and jello. Sea lions are much more food motivated and tend to not build as strong relationships with people. They are cool in the sense that they can come out of the water and do cool behaviors on land and in the water. At the aquarium however, we do not do water work with the sea lions, whereas when you work with dolphins you can get in the water and swim with them. The training is somewhat similar in both species.

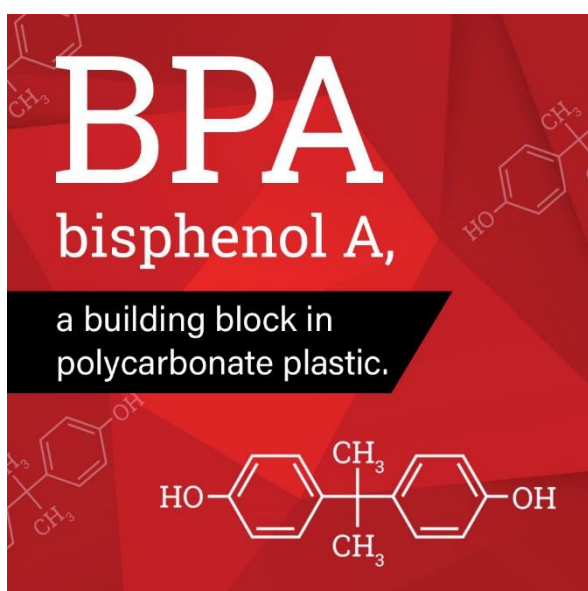
Q: When did you realize that this was what you wanted to do as your career?

A: I wanted to train dolphins when I was in high school. After I got my degree, and once I completed my internship, I got my first job with sea lions. This field is super competitive and when it comes down to it, not being picky with what species you want to work with can help you get a job. Taking a job with a species that you may not be super excited to work with can set you down the right track of working with the species you really want to work with.

Q: What does the Georgia Aquarium look for in someone and their resume when they are hiring in terms of previous experience, personality, education, etc...

A: In terms of experience, it would be beneficial to apply for the internship program in all of the animal departments. Having internship experience can be a big plus when it comes to hiring trainers. As for lower-level trainers, the aquarium likes to hire on previous interns, so that's another reason to apply for the internship program. There are no specific personalities that I would say that the aquarium looks for. Where you get your bachelor's degree from also doesn't matter. As long as you have a degree from a credible university, that counts as being qualified for the position.

One thing that I will say about this career and this field is that it is a career that you do for the love of the animals and it can be extremely rewarding, but also it is a career where you will have to work almost every weekend/holiday. The pay is very low for the amount of work that is done, so it's definitely a career that isn't for everyone. I haven't spent a Christmas with my family in over 6 years. I also have had to live frugally due to the low amount of pay and the debt that you can sometimes accumulate from going to school. Some positions pay just \$9 an hour. But I also know that if you are passionate about the animals it can be worth the sacrifice.



<https://thisisplastics.com/safety/bpa-is-it-safe/>

- Use BPA-free products. Many manufacturers are creating more BPA-free products. Look for products labeled as BPA-free. Most plastics with the recycle codes 3 or 7 may be made with BPA.
- Don't microwave polycarbonate plastic food containers. These containers are strong and durable but can break down from high temperatures. Try using glass, stainless steel, or porcelain containers.

Do you know what is in your plastic? Written by Rena So

BPA or bisphenol A. is an industrial chemical that has been used to make plastics and resins since the 1960s. It is an organic synthetic compound that is a colorless solid. It is soluble in organic solvents but insoluble in water. BPA is found in polycarbonate plastics and epoxy resins. Polycarbonate plastics are often used in containers that store food and beverages, such as water bottles. Epoxy resins are used to coat the inside of metal products, food cans, and water supply lines.

Despite the variety of uses, BPA can seep into food and beverages from containers that are made from BPA. Exposure to BPA is a concern because of possible health effects on the brain, children's behaviors, and fetuses' prostate gland. Additional research suggests a possible link between BPA and increased blood pressure. In 2003-2004 The Centers for Disease Control and Prevention (CDC) reported that they found detectable BPA levels in 93% of 2517 urine samples from people six years and older. However, the U.S. Food and Drug Administration (FDA) says that BPA is safe at the very low levels in some foods. Still, many people are concerned about the effects of BPA, so look to the left to learn about what steps you can take to reduce your exposure to BPA.

<https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/expert-answers/bpa/faq-20058331>

<https://www.healthline.com/nutrition/what-is-bpa>

<https://www.niehs.nih.gov/health/topics/agents/sya-bpa/index.cfm>

- Cut back on cans. Reduce your use of canned foods.

Does Recycling Actually Benefit You?

The latest updates to get you through the day



<https://www.cityofpacificgrove.org/living/green-pg/solid-waste-recycling/recycling>

Sources:
Glescrap.com
Usi.edu
Recycleacrossamerica.org
Thegreenteam.org

Written by Connor Wood

To many people, recycling is seen as a way to save the earth for the future. To others, it seems pointless as it does not benefit and or affect them. However, recycling does actually have immediate benefits through reducing product prices and creating more job opportunities for the future.

According to a recent Yale University Study, the current recycling level is 21.4%. It is predicted that once the U.S. reaches a 75% recycling level, it will have the same environmental effect of removing 55 million cars worth of pollution each year. This rise in recycling levels would also create 1.5 million jobs, boosting the economy.

Recycling quite clearly benefits both the consumer and business owners. One way that it saves money for both parties is seen on glescrap.com. Recycled scrap metal materials will save money on production (as they don't have to go out and mine for it). This lowering of cost could then be passed on to the consumer, saving them money. Although our current recycling levels are not at desirable levels, if we did not recycle at all, the prices of aluminum and other metals would be sky high.

Facts on Recycling

Recycling 1 aluminum can saves enough energy to power a tv or computer for 3 hours.

If every newspaper was recycled, 250,000,000 trees would be saved each year

Each year, the average American use of paper, wood, and other products obtained from trees equates to 7 trees worth.

The cost to make paper from recycled content is 50-80% lower versus making it from scratch (thus making paper cheaper for consumer).

The amount of wood and paper thrown away is enough to heat 50,000,000 homes for 20 years.

“Recycling does actually have immediate benefits through reducing product prices and creating more jobs for the future.”

- Connor Wood

Please partner with WC's Environmental Bio Club in recycling paper products in designated boxes in and around classrooms. Please don't throw regular trash in there, just paper. We can make a difference in our school community for our environment, but we need your help!

COVID - 19

By, Maddie Bradshaw

The COVID-19 pandemic has negatively impacted lives all around the world. In fact, over two million deaths have been recorded. Yet, many people don't exactly know what the infamous Coronavirus is. In short, "COVID-19 is a respiratory disease caused by SARS-CoV-2" (CDC). Its symptoms are similar to the flu. Much of those infected will experience a fever, chills, and cough. However, the severity of symptoms ranges from very mild to extremely severe. Although anyone can contract COVID, elderly people and those with previous medical conditions are at a higher risk of having a severe case. COVID is a transmittable disease that is primarily spread from person-to-person interaction. You can also get it by touching an object that has the virus on it (CDC).

In order to avoid this virus, it is important to take precautionary actions. Wearing a mask and staying six feet apart can stop the spread of COVID-19. Basic hygiene, such as hand washing is even more important. Additionally, disinfecting commonly used surfaces can help prevent contracting the virus (CDC). However, if you do end up with the virus there are measures in place to help you and those around you. A 10–14-day quarantine is a safety precaution for those who might have been exposed to COVID. Isolation is a regulation that takes place if you have the virus. Even within your own home, it is recommended to separate yourself from family for at least 10 days. However, if your condition worsens significantly you should immediately go to the nearest emergency room (CDC).

The COVID-19 pandemic is full of unknowns. However, there are simple facts that we can fall back on. Wearing a mask and social distancing are measures that can slow the spread of this disease. If you develop symptoms such as: muscle aches, loss of smell or taste, coughs, fevers, sore throat, or fatigue it is important to get a COVID test and isolate yourself until you know the results. Finally, even though our world is enveloped in so much uncertainty, we can rely on God and trust that He has a plan.

Sources:

<https://www.cdc.gov/dotw/covid-19/index.html>

<https://www.cdc.gov/coronavirus/2019-ncov/downloads/2019-ncov-factsheet.pdf>

<https://www.cdc.gov/coronavirus/2019-ncov/your-health/need-to-know.html>

<https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine.html>

<https://coronavirus.jhu.edu/map.html>

Teacher Spotlight

Mrs. Christie Burns

Why I love teaching science.....

I think the reason I began studying science and continue to do so is spurred by two things. First, the opportunity that science offered me to explore living things. I was fascinated by dissection opportunities in high school; and by the diversity of ecosystems I experienced moving around as a child. From South Florida beaches to hills of Western Pennsylvania, the diversity fueled my interest in the study of living things. Secondly, a heart to serve others in need motivated me to pursue a future in the medical field. I headed to college and invested in learning all I could about chemistry and biology. During biochemistry, the connection between the molecular world and the environment was heightened. What is the chemistry that permits photosynthesis to effectively trap the sun's energy in our food? What about bacteria allows them to withstand certain medications/environmental changes? How does genetics result in such a variety of proteins? Such an amazing Creator that crafted our world from the microscopic to the overarching carbon cycle of the universe. Being sensitive to the Lord's plans for me, I refocused my energy into teaching students.

"The ability to share the "simplicity" of our created world with students is what compels me in the science classroom."

Finding the simple in the complex...and revealing the complexity hidden in the simple. This is the marvel of science and what keeps me learning and seeking and growing as a teacher and a scientist. The world of science needs the best minds to continue to strive to understand more thoroughly our created world. As a teacher, the reward is seeing those students that I have invested in grow and explore and become leaders in their surroundings. I love how Colossians 2 summarizes this idea..."rooted and built up in him and established in the faith, just as you were taught, abounding in thanksgiving." Roots in Christ Jesus provide stability that we all need to walk, thrive, flourish in Him.

We are so grateful for all Mrs. Burns does for our school !

She cares about you and wants you to grow in your walk thru discovery.

Thank you Mrs. Burns !

	Page 5	