

## COSS 2023 – POSTER SESSIONS

### **P01. “Ethics and Diversity in Data Science”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Oriana Penalosa Ortega

Mentored by: Dr. Gregory Tanner

The technological industry has long faced issues of diversity and representation, deterring many individuals from pursuing careers in the field. To address this problem, this research aims to investigate the integration of ethics and diversity into the Concordia DATA curriculum, providing students with a comprehensive understanding of these crucial issues. By utilizing real-life data and highlighting pertinent issues related to gender and racial discrimination, this research facilitated the creation of two compelling case studies, providing students with the opportunity to analyze and manipulate data. The ultimate goal of this research is to equip future Concordia students with the knowledge and skills necessary to address issues of diversity and ethics in the technological industry.

### **P02. “Connecting through Games: an Ethnography of Replay Games”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Dean Rothstein

Mentored by: Dr. Karla Knutson

Connection in the Fargo-Moorhead community is something that is highly valued especially following the isolation of lockdown. Replay Games is a modern video and board game arcade located in downtown Fargo. Replay Games facilitates connections between people of all ages and the community. I will be researching the community by taking notes on the people I see there as well as conducting interviews with the owners and some customers who are part of the events Replay Games hosts. The results I expect are that the many events Replay Games as well as their family friendliness will show through observation that what they have to offer brings the community together.

### **P03. “Ethnography of the Fargo Public Library”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Darby Hannan

Mentored by: Dr. Karla Knutson

Ethnography is a type of research that is done by immersing oneself in a community or organization to observe the behavior and interactions of the people in that community, and then is ultimately a written report after the research is completed. I have been working on developing an ethnography about the Fargo Public Library which has involved doing research sessions, about once every week for two hours. These research sessions have included participant observation which is further broken down into writing jottings of my observations that are then developed into more in-depth fieldnotes including interviews and commentary. With this type of ongoing research, a conclusion will be presented by the time of presentation and is one that will require more time and development. However, with what I have observed so far, I hypothesize that the library ultimately serves as a space for the discovery or access to necessary information and knowledge by a diverse demographic. This lends itself to the implications and

importance of my research in that the library is a longstanding organization in the Fargo community that provides a public space for all types of people to complete such discovery and obtaining of information. The research has given me the opportunity to immerse myself in the library community that is such a large part of the larger Fargo-Moorhead area that I live in.

### **P04. “Engagement, Compliance, or Chaos: Classroom Management In Elementary Schools”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Elsie Hatlevig

Mentored by: Dr. Teri Langlie

Classroom management is crucial to establishing an effective learning environment in the classroom setting. Teachers have differing teaching philosophies as well as different classroom management strategies. This study examines diverse ways teachers in different school districts in Minnesota apply their classroom management strategies and their effectiveness. Interviews and observations will be conducted with teachers to see which strategies work best for them and their students. This project is relevant to future educators who are unsure of effective classroom management strategies or are striving to determine classroom management practices for their own teaching. The data identified multiple strategies and philosophies of classroom management.

### **P05. “Teaching Assistant at Oracle Chamber Music Festival”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Brigham Drevlow, Micah Christensen

Mentored by: Dr. Greg Hamilton

The framework of our scholarship was to investigate how to best address teaching practices at an intercollegiate level. Throughout our research we instructed lessons, assisted and studied professionals' instruction methods, and determined quality methods within lesson material. This culminated into a public performance of our students. In addition, we showcased our own work with other teaching assistants in a faculty concert.

### **P06. “Not One Less”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Alyssa Erickson

Mentored by: Dr. Fanny Roncal Ramirez

Women's rights in Latin America are very bad. There is a lot of violence against women. "Ni Una Menos" is the movement for women's rights, it began when a pregnant girl was murdered in Argentina. The girl was 14 years old. Her death was the limit for many women in Argentina. Thousands of women went to the streets and protested with banners saying "Not One Less". This protest in Argentina pushed many women in Latin America to defend their rights against violence. Now the movement is used all over the world and for many women's rights protests.

### **P07. “Using Emotional Framing to Promote Pro-Environmental Behaviors Across the Life-Span”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Hailey Puppe, Kelly Pudwill

Mentored by: Dr. Philip Lemaster

In this study, we sought to examine how people, particularly older individuals, could be motivated to engage in more pro-environmental behaviors by framing climate-change information in a way that elicits positive or negative emotions. Participants were recruited through Mechanical Turk and asked to complete a survey that randomly assigned them to a positive or negative frame. Participants first answered basic demographic questions, then were asked to read information from the EPA about the impacts of climate change in their local area. After reading that material, participants randomly assigned to the positive frame were instructed that “by taking action, you could reduce these negative effects of climate change.” Participants randomly assigned to the negative frame were instructed that “by not taking action, you could worsen these negative effects of climate change.” Previous research has found these frames to elicit a sense of hope and fear, respectively. After reading this information, participants then answered questions about how likely they were to participate in pro-environmental behaviors, how likely they would be to endorse pro-environmental public policy, and how great of a risk they saw climate change to be. We compared the means of these variables by frame, age (under age 40 vs. over age 55), and age by frame. We found that for people over age 55, the negative frame produced more willingness to engage in pro-environmental behaviors compared to the positive frame. For people under age 40, there was no significant effect of frame on willingness to engage in pro-environmental behaviors. These results suggest that, to catalyze older populations toward action, climate-change information could be framed in a way that elicits a negative emotional reaction.

### **P08. “Can Color Redundancy Cues Present in a Visual Working Memory Array be Ignored?”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Nelson Weniger, Anh Pham

Mentored by: Dr. Dwight Peterson

Visual working memory (VWM) is a vital cognitive process allowing short-term storage of visual information but is limited to processing only 3-4 items simultaneously. This limit can be increased through the use of low-level visual grouping cues. A number of grouping cues, such as color redundancy, have been shown to improve VWM performance (Li et al., 2018). Recent findings suggest that grouping cues can also be used to aid in the ignoring of objects (Prieto et al., 2022). Participants were asked to ignore the grouped stimuli (set size 6) when they appeared while performing VWM tasks. They found that when objects were grouped there appeared to be an overall improvement in the VWM tasks (Prieto et al., 2022). However, the study lacked a crucial comparison of set size making it difficult to tell if the effect was due solely to the grouping cue. The goal of the current study is to replicate and extend these results using a factorial design with factors of; set size (4, 6) and grouping cue (present, absent). If participants are able to ignore the grouped stimuli, then performance in the 6-item-grouped condition should be the same as performance in the 4-item-ungrouped condition. Preliminary results suggest that performance in the 6-item-grouped condition is between that of performance in the 6-item-ungrouped

and 4-item-ungrouped conditions. This suggests that participants are able to ignore the grouped stimuli, but at a cost to VWM performance.

### **P09. “The Role of Grouping via Spatial Regularities in Item-Item Binding in Visual Working Memory”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Anh Pham, Nelson Weniger

Mentored by: Dr. Dwight Peterson

Visual working memory (VWM) stores visual representations relevant to everyday tasks. Given that VWM is capacity limited but vital for overall cognition, the VWM system has been studied extensively (Luck & Vogel, 2013). Therefore, one of the goals for research related to VWM is attempting to improve capacity using principles of perceptual organization. Using basic visual features and objects, a wealth of research has shown that Gestalt grouping principles can improve performances (Li et al., 2018). Moreover, other findings suggest that grouping cues, such as spatial regularity between objects, can be applied to more complex real-world objects as well (Kaiser et al., 2015). Having successfully replicated the findings of Kaiser et al. (2015), the goal of the current study was to determine whether spatial regularity can facilitate item-item binding between objects stored in VWM. Participants performed a change detection task with two memory test conditions (single-item, item-item binding) for object pairs which were organized in a spatially regular (e.g., a fan appearing above a sofa) or spatially irregular (e.g., a sofa appearing above a fan) fashion. Overall, the current data set indicates that the spatial regularity grouping cue does not have the benefit on VWM performance under both memory test conditions.

### **P10. “Light and Noise Pollution Related to Property Value and Environmental Justice in Fargo, North Dakota”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Parker Delorme

Mentored by: Dr. Jennifer Sweatman

Urbanization has caused many changes, both positive and negative, to human life and the wildlife around us. One of the negative changes to life on the planet is pollution, which can come in many forms. The resulting effects of pollution are often disproportionately cast onto people of low-income areas or people from racial and ethnic minority groups. In this study, light and noise pollution are being studied in Fargo, North Dakota to determine if the levels of pollution have a correlation with property value. It is crucial to study these pollutants because high levels of noise and light pollution can have varying effects on both humans and animals. Human exposure can affect sleeping patterns and mood, while animals may be faced with changes in communication methods and other behavioral changes. To determine the pollution levels, 20 test sites of varying average property value were chosen across Fargo. Each site will be tested for noise level and light level between March 6th and March 20th, 2023. It is hypothesized that the study will reveal a positive correlation between noise and light pollution and property value of the surrounding neighborhood.

### **P11. “El compromiso con el Red River/Recreation on the Red River”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Anna Kronbeck

Mentored by: Dr. Alexander Aldrich

Like many major cities, Fargo-Moorhead has a river, the Red River, that runs through it. There are many recreational opportunities that come with a local river, including fishing, canoeing, kayaking, scuba diving, and wildlife viewing. However, our two cities do not foster enough efforts for education about waterway benefits and health, so many people in our city do not know what opportunities exist to interact with the river or know why the river is such a crucial factor in the living of our daily life. Recreational advancements not only bring joy and entertainment to the community it exists in, but it also assists the health and vitality of the river. Through commitment to the river, the environmental quality of our waterways is improved as more people care about them. Through this research and consultant with experts, it has been found that we must do more to preserve the Red River, as the river provides so much for our health, environmental wellbeing, and grounds our community.

### **P12. “Gaining an Understanding of Soil Salinization and its Impacts on Leafy Vegetables and MN/ND Farmers”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Sophie Schaumann, Priscilla Nyamekye

Mentored by: Dr. Jennifer Sweatman

Soil salinization is one of the harshest environmental factors limiting the productivity of crop plants around the globe. Increased soil salinity is caused by various land use practices, high water tables, and climate change. The negative effect salt has on plant growth has far-reaching effects on humanity: threatening food security, socio-economics, and livelihoods. This study aims to understand how soil salinity affects plant growth, and how soil salinity affects farmers in Minnesota and North Dakota. Spinach (N=20) and kale (N=20) seeds were planted in individual containers and randomly assigned to a corresponding salt concentration with which they would be treated (0%, 1%, 2%, and 4% NaCl). Samples were watered biweekly with 50 ml of their assigned solution, and plant length and width were measured weekly. After four weeks, plants were removed from the soil and their root length and complete plant length were measured. Moving forward, regression analyses on JMP Pro 16 will take place to make necessary comparisons and note significant results. We anticipate that an increasing amount of salt concentration in the soil will correlate with a decrease or suppression of plant growth. By interviewing local farmers to see how prevalent soil salinity is and how it affects their livelihoods, we will gain a greater understanding of the problem. This will allow us to connect our research results to the real-world experiences of those affected. It is imperative to learn how soil salinization affects crops and human lives to better understand how to solve the issue.

### **P13. “Summer DNR Park Operations Internship at Maplewood State Park”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Amelia Landsverk

Mentored by: Dr. Joseph Whittaker

During the summer of 2022, I worked in the Park Operations Internship position for the Minnesota Department of Natural Resources (DNR). In this presentation, I'm going to go over my role as an intern and the kind of work that I participated in at Maplewood State Park. I also conducted visitor surveys at various other Minnesota state parks in the region. This work was done to collect demographic data about who is visiting state parks in the state and to gauge improvements that could be made in terms of visitor satisfaction. I hope to convey information about what it's like to work with the DNR and shed some light on any disparities that could be seen in the system.

### **P14. “USDA sunflower research Internship”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Landon Johnson

Mentored by: Dr. Mallorie Taylor-Teeple

I will present what I did and what I am currently doing for my Internship with USDA Sunflower genetic lab. On the poster, I plan to showcase the main projects I worked on and how I contributed to the research going on there. Some of the projects I helped with were Cross techniques in sunflowers, finding traits for consumers who want to grow sunflowers, and introducing a wild population to search for new traits and select for those specific traits in a new line. I share this in hopes to shed light on more options to gain experience in the biology field in the local area, in a field that isn't talked about or explored on campus.

### **P15. “Museum Responses to Climate Change”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Kayla Adamek

Mentored by: Dr. Susan Lee

The U.S. and the world over have been slow to respond to climate change. Many factors contribute to this response, including cultural norms and practices rooted in histories of consumption and exploitation of resources. Given that museums occupy a unique position at the intersection of institution and community, they must use their power to influence cultural norms and practices to address the existential threat of climate change. This study undertook a review of museum studies literature and case studies of a select group of American museums with the objective of finding strategies for museums to address this threat. Museums studied had a publicly available strategic plan or publicized efforts in increasing sustainability. Two natural history/science museums and two art museums were included as case studies. Literature indicated that neutrality and relevancy posed challenges to addressing climate change effectively. Strategies implemented by case study museums included green building practices, implementation of environmental exhibitions and programming, divestment, and

changing values or mission statements. Less literature was available on art museums and history institutions addressing climate change or sustainability and may indicate an area for further research.

### **P16. “Insect Galls and Goldenrod Growth”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Daniel Pambbu, Naomi Gebru, Miah Sandvik

Mentored by: Dr. Joseph Whittaker

The biomass of plants is important and forms the base of all energy pyramids, and food chains thus playing a crucial role in supporting existing ecosystems. Insect galls are abnormal growths of plant tissues produced by a stimulus external to the plant itself. By conducting this experiment, it would let us be aware of any difference in the goldenrod's growth and if the goldenrod is trading off any energy and resources to be able to grow the insect galls. We have a null hypothesis that goldenrod growth patterns do not differ between areas above and below insect galls. Two alternative hypotheses will be tested. The first states that goldenrod growth is reduced in areas above insect galls when compared to areas below galls and corresponding areas on non-galled individuals, while the second states the opposite. We selected two sites to collect our samples from, choosing fifteen pairs of giant goldenrods which we collected within a 30 cm radius. We recorded the length above, and below the gall and the corresponding gall length on the goldenrod without insect galls. We dried the samples for a week and recorded biomass for each pair of goldenrods. Lastly, used a t-test and chi-square for data analysis. As for our results, we are not able to reject the null hypothesis, it could imply that galls somehow don't detract from the plant's allocation of resources or the areas we did not examine like the roots may have an impact.

### **P17. “Influence of Burning and Grazing on Small Mammal Communities Living on Remnant and Restored Prairies”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Maia Lieske, Amber Eken, Lily Haasser

Mentored by: Dr. Joseph Whittaker

In Minnesota, few prairies have survived European colonization and agricultural development. These remnant prairies are scattered and fragmented, interfering with the natural upkeep of the ecosystem. Recently, certain private and academic organizations have attempted to restore native prairie using management techniques such as controlled burning and grazing, but there is little research about their effectiveness, particularly in reference to small mammals. Using small mammals as an indicator, we hope to observe the efficacy of the current management techniques on prairie health and success of restoration. The purpose of this research is to monitor small mammal populations, diversity, and species richness in restored prairies that have implemented management techniques in comparison to remnant prairies. By comparing these sites, we can observe the effectiveness of prairie management techniques and hopefully observe an increase in small mammal populations, richness, and diversity on restored prairies that approximates those seen on remnant prairies. Collecting data at remnant and restored prairies in northwestern Minnesota has enabled us to observe the differences in mammal

species richness, evenness, and diversity. We marked grids at each prairie site, establishing live-trapping grids with 40-50 trap stations. When small mammals are captured, we identify the species, sex, and mass of each animal before marking and releasing them. Since the initiation of the project in 2012, we have observed an increase in small mammal populations in the restored prairies that is approaching the levels observed in remnant prairies. This suggests that the current management techniques are successful. We hope to gather more information about the success of burning compared to grazing, as well as optimal time rotation between implementations of these techniques.

### **P18. “A Comparison of Available Cones and Cones Cached by American Red Squirrel (*Tamiasciurus hudsonicus*) on an Urban College Campus.”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Maia Lieske, Glory Godwin Lekashu, Jenna Stilwell, Kaylee Koski, Sonja Gilje

Mentored by: Dr. Joseph Whittaker

American red squirrels (*Tamiasciurus hudsonicus*) are a widely distributed species of tree squirrel, most often associated with coniferous forest. Red squirrels are also able to adapt well to urban environments, including the Concordia College campus, in Moorhead, MN. On our campus they share their habitat with eastern gray squirrels (*Sciurus carolinensis*) and northern flying squirrels (*Glaucomys sabrinus*). Unlike these two species, red squirrels are known to be highly territorial and build and defend a conspicuous cache or larder. These caches are built during late summer and into fall and provide sustenance for the red squirrel's survival during the harsh winter. We hypothesized that red squirrels would conform to the predictions of optimal foraging theory in their selection of which cones to cache, with squirrels opting to maximize the energy gained from cones and rejecting cones that did not provide either the nutritional benefit or were too expensive to collect or consume. Building on previous undergraduate research projects, we pooled data from those projects and compared cone measurement data from red squirrel caches and measured cones on several conifers nearby these caches to gain a better understanding of cone availability and squirrel cone collection. The pooled results, including previous data and the data we collected, show a significant difference in the size of cones found in red squirrel caches and those available in the trees adjacent to the caches. The smaller cones found in caches may indicate they are easier to handle for the energy contained within their seeds. Thus, our analysis indicates that squirrels are not collecting cones at random and are likely employing aspects of optimal foraging theory with cones that are being cached.

### **P19. “A Comparison of Microplastic Content in the Gastrointestinal Tracts versus Feces of Urban and Rural Tree and Ground Squirrels (*Sciuridae*)”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Alissa Edjacin, Alexa Smith

Mentored by: Dr. Joseph Whittaker, Dr. Jennifer Sweatman

Anthropogenic plastic pollution threatens both human and ecosystem health. Plastic waste can be directly consumed by wildlife or broken down into microplastics (MPs, <5mm) that pollute the water, air, and soil. Microplastics are emerging as a threat to several biomes, with marine ecosystems being the



most thoroughly studied to date. Less is known about the prevalence and environmental impact of MPs on the terrestrial environment. Previous lab studies have observed MP distribution and accumulation in mammalian liver, kidney, and gastrointestinal tract (GIT) samples. The prevalence of MPs is becoming increasingly recognized as a threat to public health and environmental conservation. The purpose of this study seeks to determine if the feeding behavior of the mammals influences the number of MPs existing in the GIT, using feces as a representative subset for the GITs of living squirrels. We hypothesize that all specimens sampled will contain MPs and that urban-dwelling squirrels will contain a greater number of MPs than rural squirrels. We also hypothesize that there will not be a significant difference between the number of MPs in gray squirrels versus red squirrels. Specimens were obtained as salvages or incidental mortalities. All GIT organs were collected and frozen until the time of tissue digestion. Existing feces was collected from the bodies and the rectum of salvaged squirrels, and collected from living squirrels. Feces was frozen until the time of digestion. Each sample was chemically digested using a 10% KOH solution. Samples were vacuum filtered and examined using a dissection microscope. For standardization, we will calculate the number of MPs per gram (g-1) organ mass, or feces mass. We will be presenting preliminary results.

**P20. “Comparison of the Microbiomes of Urban and Rural Eastern Gray Squirrels (*Sciurus carolinensis*) and Eastern Fox Squirrels (*S. niger*)”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Rhaegan Kiland, Grace Ivesdal, Andie Kassenborg, Kylie Mitchell Lipetzky

Mentored by: Dr. Joseph C. Whittaker, Harshana De Silva Feelixge, Dr. John Flaspohler

A microbiome consists of a diverse array of microorganisms living within a host organism. The microbiome in animal gastrointestinal tracts is associated with digestion, metabolism, immunity, and processes related to development and behavior. Composition and diversity of the gut microbiome is associated with diet. Previous research found that organisms with a strictly plant-based diet have more diverse gut microbiota, as opposed to those who include meat in their diet. Due to the expected differences in diets among rural and urban squirrels, we expect to find consistent differences in their microbial biomes. Our goal in this project is to identify the types of bacteria in the ceca of Eastern Gray (*Sciurus carolinensis*) and Eastern Fox Squirrels (*S. niger*) who live on or around Concordia College in Moorhead, Clay Co., MN, Minneapolis, MN, and locations in rural ND. We hypothesize the diets of rural squirrels, having a more natural, plant-based diet, will have a more diverse microbiome than urban squirrels. Further, we hypothesize that the urban squirrels, with increased access to processed food and exposure to human food sources, will have lower microbiome diversity within the cecum. To test our hypothesis, we collected samples and cultured bacteria from squirrels salvaged opportunistically as found dead, as road kills, or donated by hunters. Once ceca contents were extracted, they were diluted and plated on LB agar plates with cycloheximide. After incubation, LB agar was used to make master plates for future identification. Bacteria were cultured and grown on master plates and Gram stained. Distinct colonies will be chosen to be used in Colony PCR to determine genetic composition. The remaining samples were added into a glycerol broth to be preserved for future use. The diversity of bacteria present will be used to classify the microbiome and compare diversity between urban and rural squirrels.

**P21. “Chemoproteomic Development of Ligands to Target E3 Ligases for Targeted Protein Degradation”****Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Hannah Olson

Mentored by: Dr. Christopher Parker, Dr. Woojin Choi

Many current diseases can be traced back to protein dysregulation in the body. Current methods of protein degradation in the lab are too unspecific to be applied as treatment. Targeted protein degradation is needed to ensure that only proteins of interest (POIs) are being degraded and not proteins essential for bodily function. Proteolysis Targeting Chimeras (PROTACs) offer this method of specific, targeted degradation. PROTACs function by attaching to the POI and an E3 ligase; the PROTAC promotes the ubiquitination of the POI via the E3 Ligand. This recruits the cell's own ubiquitin-proteasome system to degrade the POI. The Parker lab performed a chemoproteomic screening of potential E3 ligand fragments to attach to the E3 ligase which yielded the E3 ligands used in this research. The ultimate goal of this research was to determine the efficacy of the PROTACs created and which E3 ligases are being utilized by the PROTACs.

**P22. “Investigating The Curing Process on Chitosan-Alginate Bioplastics Using Various Concentrations of Metal Chlorides”****Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Seema Mustafa, Bella Brezonick

Mentored by: Dr. Graeme Wyllie

Bioplastics have been intensively researched in hopes of replacing the more common less biodegradable plastics. The bioplastics in this study were formed from two polysaccharides: sodium alginate, acquired from brown seaweed, and chitosan, which is obtained from chitin from the exoskeletons of arthropods. Formation of the bioplastic is done via crosslinking, that is forming interactions between separate polymer strands in an aqueous environment which leads to the formation of hydrogels which then dry to give the chitosan-alginate bioplastic films. The final step, prior to drying is the treatment of bioplastic with a solution of calcium chloride which causes the alginate strands to crosslink. In the second-semester general chemistry class at Concordia College, 1 M calcium chloride is traditionally used to cure bioplastics. The effects of changing the concentration of calcium chloride and the duration of curing time along with substituting other metals for calcium were investigated.

**P23. “Activity and Selectivity of Nanocrystalline Pd<sub>2</sub>Sn Catalyzed Nitroarene Reductions”****Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Aaron Oakes

Mentored by: Dr. Javier Vela

Azo compounds are common dyes in the textile industry and are most often used for reds, oranges, and yellows. The most common means of making them today requires a lot of energy and poses safety risks, providing incentive to develop new methods of making these compounds in bulk. The Pd<sub>2</sub>Sn nanocrystal

catalyzed NaBH<sub>4</sub> reduction of five nitroarene compounds is investigated. Liquid Chromatography/Mass Spectrometry (LC/MS) and UV-Visible Spectrometry are used to determine how different substituents affect the selectivity of Pd<sub>2</sub>Sn to the azo product. It is found that in four out of five nitroarenes, a reduction reaction catalyzed by Pd<sub>2</sub>Sn is selective to the azo product. This includes three substituted nitroarenes with substituents covering a range of electronegativities and one nitroarene containing two nitro groups, resulting in an intramolecular ring closing reaction.

### **P24. “The Proposed Function of Protein 2QRU”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Alexis Sampson, Teddy Eggen

Mentored by: Dr. Julie Mach

The Protein Structure Initiative was a nationally funded project from 2000-2015 to find and construct the structures of thousands of proteins for the purpose of creating a public protein database. Today, many proteins in this database have undefined functions and little to no research has been completed on them. The BASIL course was created to encourage undergraduates to complete this task with a chosen protein. Using a combination of different programs such as SPRITE, Chimera, BLAST, and Pfam, the unknown function of one protein, 2QRU, was investigated. 1ZOI is a protein that was discovered with the earlier mentioned tools to be related. Because the esterase 1ZOI belongs to the same superfamily and has an almost identical residual binding site with 2QRU, it is hypothesized that the 2QRU may be an esterase. This hypothesis is further tested in lab to determine if it is accurate or not.

### **P25. “Functional Determination and Analysis of Protein 3B7F”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Christian Thingvold, Elizabeth Fedorchak

Mentored by: Dr. Julie Mach

The protein structure initiative began in 2000 with the goal of determining the structure of all proteins, and creating a structural database. Since then, the structure of proteins has been determined and logged within the Protein Data Bank (PDB). While the structure of these proteins in the PDB have been determined, the function of many remains unknown. Protein 3B7F is one of many proteins with a known structure and unknown function. The goal of our research was to determine the possible function of 3B7F by analyzing its sequence and structure using the following; SPRITE (identifying proteins with similar active site structure), Chimera (examine and compare protein structure), RCSB PDB (examine previous info on protein), BLAST (sequence analysis program comparing proteins with known function to unknown protein to determine possible functions), and InterPro (determine hypothesis of function). Using bioinformatics resources we have concluded that 3B7F is a hydrolase enzyme. Additional research in the lab will be used to support and further this information.

### **P26. “Analytical Detection of Bisphenol-A in Water Samples”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Jason Tikkanen

Mentored by: Dr. Mark Jensen

The problem that my presentation addresses is our own health, and having water to drink that is clean. To do this we had to create a process to detect bisphenol-A (BPA) in water. I then used that process to study the Red River and see how urbanization affects the levels of BPA in it. My hypothesis was that as water moves through Fargo/Moorhead, it will increase its levels of BPA the farther North you go. Samples were made in the lab with processes/techniques that included SPE, and derivatization. To analyze the samples we made that contained the BPA, we used two different instruments, HPLC, and GC-MS. Results were that as the water moved through the city, its levels of BPA increased by about 4X. My hypothesis was proven correct, but more research is needed to determine what counts as a safe level of BPA that humans can consume without being affected by it.

### **P27. “El oro azul del Perú: El auge del arándano (The Blue Gold of Peru: The Blueberry Boom)”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Edmund Buscho

Mentored by: Dr. Fanny Roncal Ramirez

This poster will be in communicated in Spanish.

En poco más de una década, el Perú se ha convertido en el primer exportador mundial del arándano. Este póster tratará del desarrollo del cultivo del arándano en Perú y su mercado internacional. El clima peruano permite el cultivo del arándano tras todo el año. Este póster también investigará los métodos agrícolas que por parte hacen posible el auge de producción tan rápido. Los efectos económicos son otro componente importante del auge. El arándano peruano, apodado el oro azul, ha logrado ser exportado a países lejanos como Israel y Japón. Este póster también examinará por qué se ha convertido tan popular el arándano como súper alimento lleno de antioxidantes. Este póster será en español. In little over a decade, Peru has become the number one exporter of blueberries in the world. This poster will examine the development of blueberry cultivation in Peru and its international market. The Peruvian climate allows for the cultivation of blueberries throughout the whole year. This poster will also investigate the agricultural methods, which in part make possible the rapid boom in production. The economic effects are another important component of the boom. The Peruvian blueberry, nicknamed blue gold, has achieved exportation to far-reaching markets such as Israel and Japan. This poster will also examine why the blueberry has become so popular as a superfood full of antioxidants.

### **P28. “LIFE in Costa Rica”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Megan Madill, Cody Urie

Mentored by: Dr. Joseph Whittaker

The significance of this presentation is to introduce individuals to the different methods of sustainability. In Costa Rica, there are different climates and access to different resources, so part of LIFE’s goal was to teach volunteers ways that they could take the skills that they learned at the farm, and implement them into their life, wherever they may be from. Spending time in Monteverde, Costa Rica, there were many new things to experience. Language, cultural norms, foods and more were all different from Minnesota. As part of volunteering at LIFE, everyday had different tasks to take on. Along with that, many tasks had different contributions to the three pillars of sustainability. Research at LIFE was conducted through these day-to-day tasks. Tasks of creating bio-fertilizer, organic fungicide, and assisting in bokashi composting were some of the big tasks. Other small tasks included planting and harvesting of crops, tending to animals, and various labor projects. Understanding the impacts that your current actions are having on the environment is part of the goal of LIFE. Also, leaving with new and improved ways of actions in your daily lives is important to LIFE. Reducing plastic or waste products, committing to reducing gases into the atmosphere, and replenishing what you take from the environment are three possible ways of contributing to create a more sustainable environment for all of us to live. We want to show a different perspective on sustainability and how it can impact locally.

### **P29. “The Most Sustainable Country in the World: A Review of Sustainability in Norway”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Rachel Andersen

Mentored by: Dr. Bryan Bishop

There has never been another threat to humanity quite like climate change. No war, plague, agricultural crisis, or cosmic threat has ever imperiled the existence and prosperity of humankind in the way that climate change has. It is common knowledge nearly everywhere around the world that a global increase in temperature of more than 2 degrees Celsius would have detrimental impacts on the planet through the effects of climate change (Norby et al., 2020). In order to avoid this disastrous fate, global greenhouse emissions would have to be reduced by more than 60% by the year 2050 compared to the levels in 2010 (European Commission, 2019; United Nations’ Intergovernmental Panel on Climate Change (IPCC)). This, however, is just the bare minimum; to truly save the planet from collapsing at the hands of climate change, there must be more intense and rigorous changes around the world (Norby et al., 2020). Some countries are doing a better job than others in the fight against climate change. Norway has long been a leader in mitigating the effects of climate change. Norway has even been claimed to be the most sustainable country in the world, but what does this mean and how was it determined? What exactly is the definition of sustainability? This review will explore the definition of sustainability, what it means in the climate change mitigation context, the ways in which Norway is leading in the fight against climate change, and whether or not Norway can really be considered the most sustainable country in the world.

**P30. “Anticoagulant Use in Voluntary Plasmapheresis”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Gendra-Marleen Aasmaa

Mentored by: Dr. Tally Tinjum

Plasmapheresis is a procedure used to separate blood plasma from other blood components using an apheresis machine. Plasma is collected from healthy eligible donors mainly for pharmaceutical purposes. During plasma donation when the blood comes in contact with the tubing of the apheresis machine, there is a potential for contact-mediated clotting, because the donation process demands fluidity of the blood anticoagulant is used (Lee & Arepally, 2012). Plasma donation primarily uses trisodium citrate 4% solution administered intravenously (Bialkowski et al., 2016). This leads to anticoagulant circulation in the donor which is the cause of the most common apheresis-specific reaction- hypocalcemia. The decrease in the concentration of ionized calcium can manifest clinical symptoms such as chills, nausea, twitching, and tremors. (Plasma Protein Therapeutics Association, 2012). Although, one of the first symptoms of low calcium levels is paresthesia which is experienced by 12.1%-39% of donors (Lee & Arepally, 2012). It is crucial to consider that most countries allow 24 voluntary plasma donations per year. However, the United States allows up to 110 apheresis donations in a year (Bialkowski et al., 2016). The high legal limit of plasma donations allows for frequent anticoagulant exposure. This literature review attempts to review the use of anticoagulants in plasmapheresis considering its necessity and highlighting the causes of concern as citrate anticoagulant exposure causes changes in the donor’s mineral homeostasis. As multiple authors urge research into the long-term effects of ionized calcium and the fluctuations in bone density in frequent plasmapheresis donors (Bialkowski et al., 2016).

**P31. “Association Between Hamstring and Low-Back Flexibility and Sprint Speed”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Kyra Nichols, Tegan Marty

Mentored by: Dr. Emily Huber-Johnson

Flexibility has been shown to improve range of motion, decreasing risk of injuries; yet there is little research that investigates the relationship between hamstring and low back flexibility and sprint speed. : The purpose of this study was to explore the association between hamstring and low back flexibility and sprint speed in young adults. Participants (n=60) were a convenience sample of 18-25 year-olds. Data was collected during one session in the Concordia College Human Performance Lab and indoor track. Participants were categorized as “active” if they engaged in a minimum of 30 minutes of moderate-intensity aerobic exercise at least three days per week for at least three months. Those reported engaging in activity less than the before mentioned specification were categorized as “nonactive”. Prior to assessment of flexibility and speed, participants completed a five minute warm up. Participants completed three trials of a standard sit and reach test and two trials of a 40-yard sprint. T-tests were used to evaluate differences in variables by gender. Linear regression analyses were used to identify associations between sit and reach score and 40-yard sprint time in the whole sample and by gender with statistical significance set at  $p \leq 0.05$ . Regression models controlled for the following confounding variables: height, weight, gender, activity level, and BMI. A significant association was found between sit

and reach and 40-yard sprint time in the whole sample ( $p=0.007$ ), in males ( $p=0.03$ ), and females ( $p=0.03$ ). Results were also found for the confounding variables.

**P32. “Targeting DDX24 Gene of *Danio rerio* Using CRISPR-Cas9”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Karissa Finnigan

Mentored by: Dr. Carol Pratt

DDX24 is a protein-coding gene that encodes for the DEAD-Box Helicase 24. Muscle cells contain an enriched amount of the DDX24 protein. A mutation in the DDX24 gene leads to misregulation of muscle position control genes and patterning control genes that are crucial for organogenesis and tissue positioning. I designed the single guide oligonucleotide, forward and reverse primers using Benchling, and ordered them from Integrated DNA Technologies (IDT). I used CRISPR-Cas9 techniques to cause a small deletion (approximately 1-3 base pairs) in the *Danio rerio* DDX24 gene. Once the CRISPR-Cas9 techniques were complete, I used a 3% agarose gel to perform gel electrophoresis to determine if the sgRNA was able to direct Cas9 to cut the target sequence. The primers I designed were able to successfully amplify the expected product (band displayed at 750bps), but they also amplified other DNA segments (approximately 450 bps and 150 bps). Although the primers I designed were successful in amplifying the DDX24 gene, the gel did not display the band sizes expected (154 bps and 440 bps) if the sgRNA was able to guide Cas9 to the target DNA. There was sgRNA, as detected by Nanodrop, therefore there was sgRNA to direct Cas9. These results could mean that the sgRNA I designed did not guide the Cas9 to cut the target DDX24 DNA, among other plausible reasons.

**P33. “Using CRISPR to Make a Deletion in the MAP3K15 Gene in *Danio rerio*”**

**Time:** 9:00 - 10:15 a.m. | **Session:** Poster 1 | **Location:** Centrum

Student Author(s): Ethan Tong

Mentored by: Dr. Carol Pratt

MAP3K15 is a gene important in a phosphorylation cascade crucial for cell signaling. MAP3K15 is part of the MAPK family. Without MAPK, the cell will fail to coordinate cell proliferation, differentiation, motility, and survival. Using CRISPR, a DNA editing tool, a small 1-3 base pair deletion in the MAP3K15 gene in *Danio rerio* can be made. This deletion would cause the loss of function of MAP3K15. I designed forward and reverse primers and a single guide oligonucleotide using Benchling and ordered them from Integrated DNA Technologies. Using PCR, the forward and reverse primers were used to amplify the target exon of MAP3K15 *Danio rerio* DNA. CRISPR-Cas9 and the designed sgRNA were used on the amplified target sequence in order to create the deletion. To see if a deletion occurred, I ran a 3% agarose gel. Gel electrophoresis showed that I did successfully amplify the 750 bp target region of MAP3K15 using PCR. It also showed that CRISPR-Cas9 did not cut the PCR product. Instead of two bands being present as predicted (one at 518 bp and the other at 129 bp), a faint band at 750 bp was there. Nanodrop tests indicated that I had sgRNA to direct Cas9 meaning that wasn't the issue. These results can be attributed to potential contamination, poor sgRNA design or faulty Cas9 protein. In conclusion,

CRISPR could be used to potentially knock out a gene, but further investigation would be needed in order to get proper results.

### **P34. “Haití: El sincretismo transatlántico y la religión (Haiti: The Transatlantic Syncretism and Religion)”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Alissa Edjacin

Mentored by: Dr. Fanny Roncal Ramirez

El sincretismo se define como la fusión de dos o más formas flexivas originalmente diferentes y el sincretismo transatlántico se refiere específicamente a la fusión que ocurrió a través del océano Atlántico entre África, Europa y las Américas. Ya sea religiosa, cultural o culinaria, la cultura Haitiana ha sido redefinida por ese sincretismo. A pesar de la mezcla de religiones en Haití, el vudú se considera una religión menor en muchos lugares y tiene una connotación negativa en la sociedad Haitiana (Murrell 67). El objetivo de esta investigación es analizar las complejidades religiosas de Haití y la medida en que el sincretismo transatlántico afectó las creencias religiosas en Haití. Los datos recopilados provienen de fuentes primarias y secundarias, lo que hará posible pintar una imagen más amplia de la cultura vudú a medida que se examina información antigua y nueva. También se realizarán entrevistas y encuestas presenciales y online y se recogerán los datos en un análisis cualitativo. Esta investigación es importante porque hay una investigación mínima sobre el vudú Haitiano, mientras que el vudú de NOLA y el vudú Africano han tenido más exposición. Por lo tanto, la investigación realizada para este ensayo puede arrojar luz sobre el vudú Haitiano y servir como un examen poscolonial con la esperanza de que los Haitianos analicen los puntos de vista y consideren si son realmente suyos o les han sido impuestos como resultado del colonialismo.

Syncretism is defined as the fusion of two or more originally different inflectional forms and the transatlantic syncretism refers specifically to the fusion that happened across the Atlantic ocean between Africa, Europe and the Americas. Whether it is religious, cultural, or culinary, Haiti’s culture has been redefined by said syncretism. Despite the amalgamation of religions in Haiti, Voodoo is seen as a lesser religion in many places and holds negative connotation in Haitian society (Murrell 67). The goal of this research is to analyze Haiti’s religious complexities and the extent to which transatlantic syncretism affected religious belief in Haiti. The data collected comes from primary and secondary sources which will allow a broader picture to be painted of the culture of voodoo as information both old and new are examined. Interviews and surveys will also be carried out in person and online and the data will be compiled in a qualitative analysis. This investigation is important because there exists minimal research on Haitian Voodoo whereas NOLA Voodoo and African Voodoo have gotten more exposure. Therefore, investigative research done for this essay can provide insights on Haitian Voodoo and serve as a post colonial examination in hopes that Haitians analyze the viewpoints and consider if they are really their own or have been imposed on them as a result of colonialism.



### **P35. “Cambia Social como Resultado de Mujeres - Las Madres de la Plaza de Mayo”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Veronica Wolfe

Mentored by: Dr. Fanny Roncal Ramirez

This poster will be communicated in Spanish.

During the 20th Century in Argentina, a history of governmental centralism and political uprisings gave way to a series of dictatorships and tragic human rights violations. After his 1976 overthrowing of the previous Argentine leader, Armed Forces general Jorge Rafael Videla became Argentina’s newest dictator and assumed ultimate control of the country. Videla focused on controlling the people’s access to oppositional media, the free speech of intellectuals and his opponents, and initiated the disappearance and killing of thousands of young men when he felt his control wavering. Las Madres de la Plaza de Mayo began when women viewed their sons’ disappearances as an intentional act rather than isolated incidents. What began as several women protesting together in the form of silent marches became hundreds of mothers wearing white headscarves, distributing photos of missing adolescents, and protesting together. Their power came from their unwavering determination, despite the dangers involved, to find their sons and their strength in numbers. Las Madres impacted the course of the revolution against Videla- these mothers strived to make the public understand that protesting does not equal terrorism and that their sons may have been taken, but their maternal love cannot be taken away. Las Madres de la Plaza de Mayo slowly shifted their view to a more generalized look at how Videla’s government violated human rights and initiated the abuses against any perceived opposition. Their work helped raise awareness to the human rights abuses that permeated Videla’s dictatorship, and also helped initiate a change to a democratic system of government after Videla left office. Despite many of Las Madres never seeing their sons again, their effect on modern Argentina remains strong and ever important. Two years after the democratic regime took over Argentina’s government from Videla, Videla was charged with and declared guilty for the disappearance and killings of hundreds of Argentine people during his rule. Today, we see the ever-strong influence of protests that is imbedded in the Argentine culture and a multitude of parks and honors dedicated to Las Madres de la Plaza de Mayo. Argentina celebrates the mothers’ strength and determination to defend human rights, and many of these women continue to protest to prevent their work and their sons’ murders from being forgotten.

### **P36. “Family Law: The Good, Bad, and Ugly - As Told by Local Family Law Attorneys”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Kayla Molstre

Mentored by: Dr. Karla Knutson

Family law is among the most personal forms of law - it deals directly with the relationships between family members. Family attorneys work alongside their clients everyday in dealing with some of life's most intimate, sensitive components - divorce, child custody, adoption, prenuptial agreements, gestational carrier agreements, and LGBTQ+ law. While these topics are assumably taxing on the clients, I decided to delve even deeper into the practice and explore the impact that this type of law has on its attorneys. Across the span of several weeks, I am both observing and interviewing eleven family law attorneys and their day-to-day work. By both watching and inquiring about their practice, I seek to

## COSS 2023 – POSTER SESSIONS

inform the masses on an entirely new perspective - the type that you can only get by being in the firm. Together with the attorneys of Gjesdahl Law, P.C., I will be analyzing the effects that practicing family law have on the attorneys doing it.

### **P37. “Zapatos y retratos: La vida cotidiana española”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Kaija Johnson

Mentored by: Ady Johnson

Presenting digital, narrated photography, this art exhibition depicts a series of Spanish portraits and street photography. It visually transmits the culture and daily life of Spaniards. The exhibition includes photos from the Spanish autonomous communities of Madrid, Castilla y León, Andalucía, Asturias, Galicia, and las Islas Canarias. The photos were taken during a semester study abroad program.

### **P38. “Representation of ASD in Literature”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Kayla Moe

Mentored by: Dr. Amy Watkin

The goal of my research this past summer was to bring greater awareness to ASD and help those diagnosed with the disorder find representation through literature. Autism spectrum disorder, or ASD, is commonly generalized in many ways that do not fully encompass the wide range of identities that intersect with ASD and therefore come nowhere near full representation. By researching literature about ASD and developing a resource that indexes it, I can help those diagnosed with the disorder find books that reflect their unique, individual experiences. In conducting my research, I looked for books that accurately represent ASD in intersection with other identities. This includes books about women, people of color, parents, children, and more who are diagnosed with ASD. I particularly focused on selecting literature that was written by authors who identify with having an ASD diagnosis or who have a close connection with someone on the spectrum. The final product of my research is a website resource that indexes literature about ASD and categorizes it for greater accessibility. These categories are divided by traditional genres as well as the unique identities they represent, such as race, sexuality, gender, age, and more. Each book is listed with a brief synopsis. This website is an ongoing project intended for use by educators, parents, students, and anyone else who wants to learn more about ASD, as well as for those on the spectrum looking for personal representation.

### **P39. “Health Care Disparities in Indigenous Women in Guatemala”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Gissell Arevalo Martinez

Mentored by: Dr. Fanny Roncal Ramirez

Indigenous women around the world face numerous of disparities that can all connect to each other. In many Latin American countries the life of an indigenous women is one of the most vulnerable life to live in, experiencing in the worse in many different aspects of life. According to (Chomat, alt), the number one cause of death amongst indigenous women is complicated in pregnancy-related situations. Health care is a privilege in many different countries. Women are at a socioeconomic disadvantage when it comes to receiving adequate health care services. It becomes difficult for them to experience quick access. According to Ceron, atl., Guatemala has one of the highest proportions of indigenous groups. Guatemala has 23 ethnic groups and around 45% of the population belongs to one of the 23 groups. Like many Latina American countries, Guatemala’s history of colonization has brought massive destruction and disparities in their pre-colonial communities and current communities. Understanding what indigenous people in Latina American countries go through, is understanding how and what polices in these countries are doing about the issues. I will be reading papers that have given me an insight of what Guatemala is facing with their indigenous communities in the health care systems and making a qualitative analysis. It is not surprising that indigenous communities face disparities, the results are to showcase the reality and day-to-day experiences of indigenous women in Guatemala. This project will also be given in Spanish. The reason why it will also be in Spanish is because of the diversity of research. The research is given in Spanish, therefore, to spread awareness of the variety of research done in different languages. This carries the weight of language barriers that many people don’t fully understand and to acknowledge that many people go through language barriers that are then discriminated against through many institutional system in place.

### **P40. “Pharmaceutical Research and Healthcare in Colombia (La investigación farmacéutica y el servicio de salud en Colombia)”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Hannah Olson

Mentored by: Dr. Fanny Roncal Ramirez

This poster will be communicated in Spanish.

Scientific research and development in pharmaceuticals are major investments and exports of the United States. Research can be transformed into opportunities in industry and business as well resulting in a net positive for the economy. This attracts many bright minds from around the world but results in brain drain of other countries. I specifically will take a look at Colombia and their government’s growing support of pharmaceutical research and development in their own country. I will also look at how this impacts the economy and healthcare of Colombia. Also, Colombia, like many Latin American countries, has a large presence of homeopathic medicine which combines in interesting ways into modern medicine and healthcare. Additionally, I will explore how an improvement in governmental support might positively affect the populations of these countries.

## COSS 2023 – POSTER SESSIONS

### **P41. “Hello, Neighbor”: Becoming One with First Grade Culture (Again)”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Sydney Olson

Mentored by: Dr. Karla Knutson

This research is meant to tie together the practice of ethnography and around fifteen 1st grade students who welcomed a 19-year-old college student into their classroom. The purpose of ethnography allows a curious mind to observe and identify patterns among a group or culture, interview members on their experiences within said culture, and for the researcher to integrate themselves so that they can walk as if the members’ shoes were their own. Two to three hours are being spent each week for a total of seven weeks following the first graders through their school day routines, including morning announcements, math time, music, physical education, science lab, and more spontaneous events, such as a 1st and 2nd grade spelling bee. Six interviews are in the process of being conducted among the first graders’ teacher, student teacher, principal, music teacher, counselor, and special education coordinator. I took jottings during my observation and wrote in a field journal after each session to reflect on the social interactions that were presented. Implications show that boys and girls tend to stick around companions of the same gender. Boys tend to be more rowdy, less likely to follow directions, and have been seen to act and speak out of turn more so than girls, yet girls tend to be more emotional and are willing to call out both peers and strangers when necessary. Overall, developmental milestones, patterns, and behaviors can be recognized when becoming one, once again, with first grade culture.

### **P42. “Systematic Training of the Voice Throughout Time”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Matthew Mortensen

Mentored by: Dr. Anthony Leathem

The study of training the vocal mechanism has evolved throughout time, moving from an oral tradition to the written, systematic practice of training the voice. In the 16th century, national schools of singing began to be established to emphasize certain styles of singing. This poster will follow the evolution of the systematic training of the voice and the changes of teaching philosophies from notable pedagogues such as Manuel García, Enrico Caruso, Richard Miller, and Kari Ragen. This research will examine the differences in the structure of their teaching, differing use of terminology, and the different emphasis each teacher has on a certain school of singing.

### **P43. “Promoting Sustainability and Reducing Food Waste Through Vermicompost on Campus”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Mya Hassebrock

Mentored by: Dr. Jennifer Sweatman, Dr. Jonathan Steinwand

Sustainability on campus has been a big focus for Concordia, especially since President Craft signed the climate commitment in 2017. Two focus areas related to sustainability on campus are educating students about sustainable living habits and reducing food waste. While there has been a focus on food

waste reduction in the dining center, there has not been much discussion about food waste in the residential buildings on campus. This project proposes the implementation of vermicompost bins in the residential buildings on campus, starting with one as a pilot bin to observe and learn from, and installing more in the future. Vermicompost involves the breaking down of organic materials, such as fruit and vegetable scraps, into a nutrient-rich compost that provides many benefits to plants. Not only would this provide students with a hands-on opportunity to learn about a sustainable living habit, it would also reduce food waste in the residential buildings, and produce nutrient-rich compost for campus use. I have carried out a survey to gauge student interest in the idea of vermicomposting, as well as to gauge the kinds, amount, and frequency of food waste. The survey received 37 responses, 25 of which were students living on campus. Most of the responses have shown either neutrality or support for the project. This project will result in a detailed plan for future maintenance and implementation of vermicompost bins in the residential buildings on campus.

#### **P44. “Pollution in the Aquatic Environment: Microplastics In Still Water Bodies Affected by Varying Levels of Human Development”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Narjis Albuothah, Fatima Mohammed, Favziya Rasulova, Mubina Rasulova, Stella Peterson

Mentored by: Dr. Joseph Whittaker, Dr. Jennifer Sweatman

Despite microplastics' widespread presence, they pose a major threat to our aquatic environment due to their ecological consequences. While many studies have focused on microplastic pollution in marine waters, little is known about its occurrence and sources in freshwater systems. This research study aimed to investigate the presence and concentration of microplastics in different freshwater sources and their relationship with human occupation. Samples were collected from RO water, tap water, and several lakes and ponds in high and low-human occupation areas. Microplastic concentration was measured using a Büchner funnel filtering system, and the data collected was analyzed using ANOVA analysis of variance. Results showed that waters near high human development had a significantly higher concentration of microplastics than those in low human occupation areas. The results suggest that manufacturing processes, landfill operations, and littering are major sources of microplastics in freshwater systems. Studies such as this highlight the need for further research to assess the environmental impact of microplastic pollution in freshwater systems and the development of effective strategies to mitigate this growing problem.

#### **P45. “Environmental and Cultural Impacts of the Loss of American Elm and Ash Trees in Moorhead, MN”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Mitchell Lejcher, Carter Slette, Landon Johnson

Mentored by: Dr. Jennifer Sweatman

Elm and Ash trees are the two most prevalent tree genera within the City of Moorhead. With the encroachment of Dutch Elm Disease and the Emerald Ash Borer these trees are lost to both these

## COSS 2023 – POSTER SESSIONS

sources as well as the management practices that keep them at bay. The loss may have impacts both environmentally and culturally. We hypothesize that their loss will ultimately negatively impact the recycling of CO<sub>2</sub> and the protection from urban heat island effects. The cultural loss comes in the form of a drastic change in the natural landscape of the city, the two genera are staples in the city's streets and canopies. We aim to model these potential impacts using the city's tree survey data and raise awareness to the environmental and cultural effects using traditional print media. We expect the loss of biomass from American Elm and Ash trees to result in models that suggest increased CO<sub>2</sub> levels in the Moorhead area that lead to increased temperatures.

### **P46. "A Summer as a Naturalist at Tettegouche State Park"**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Kelly Harris

Mentored by: Dr. Joseph Whittaker

This project will present my experience at Tettegouche State Park working as a Naturalist in 2022. I will talk about opportunities in the Department of Natural Resources (DNR) and what my duties as a naturalist entailed. I will give an example stop-by-program highlighting one of the programs I made this summer. I will showcase how programming is prepared and conducted using education materials and props. I will showcase a presentation I prepared on Monarch butterflies and their life cycle. I will showcase Tettegouche State Park and present data on how many people I reached over the summer. Naturalists play a huge role in science communication and engaging with the public and I hope to inform the campus community of this potential opportunity and career option.

### **P47. "Analysis of the Diet and Habitat Preference of Minnows in Long Lake, Minnesota"**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Grant Anderson, Gabe Sparks, Therese Byankuba, Gavin Groshelle

Mentored by: Dr. Joseph Whittaker

Minnows are small freshwater fish (Family Cyprinidae) that live in a variety of areas including springs, lakes, ponds, and rivers. Previous research has indicated they are abundant in Long Lake, Becker County, Minnesota. Minnows live near shallower, warmer water, and are scavenger hunters. Our goal was to use minnow traps to investigate the abundance of minnows in areas of Long Lake, and to investigate the efficacy of different bait. We sampled three locations, one near a dock that was partly shaded, one near a rocky flat in full sun, and a cattail marsh. In each location we placed three minnow traps, one baited with dog food - more nutritionally balanced, a second with cat food - more protein-rich, and a control with no bait. Within a habitat type, traps were set 5m apart parallel to the shore. Traps were set up on three Mondays' and left overnight. The following afternoon minnows were counted, measured, and recorded. Minnows were released following measurements. We caught 70 minnows at our location near the dock, five at the rocky flat, and none at the cattail site. Our only statistically significant result observed was between locations. Thus, the location did affect the number of minnows caught. Bait type did not affect the number of minnows caught. Neither bait type nor location had an effect on the length

of the minnows caught. Our experiment can be valuable to future studies of fish or minnows at Long Lake, and possibly serve as a control reference to other researchers.

### **P48. “Ruthenium Complexes and Their Applications Towards Dye Sensitized Solar Cells”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Benjamin Brekke

Mentored by: Dr. Kadarkaraisamy Mariappan

The world is in an energy crisis and needs to start transitioning to renewable energies such as solar energy. A promising new type of solar energy has gained a lot of traction as of late, Dye Sensitized Solar Cells (DSSC). Our focus is to synthesize a ruthenium complex that contains a dipyrzolyipyridine ligand integrated with anchoring groups such as the carboxylic acid (-COOH). Ruthenium complexes are recognized as one of the best dyes that can absorb light energy efficiently when it binds on Titanium (IV) Dioxide. This combination is then used in a Dye Sensitized Solar Cell. The goal of our ligands is to make the light capture ability of the DSSC more effective. By using these ruthenium complexes, it is determined these complexes will create a more favorable reaction with the Titanium (IV) Dioxide allowing quicker and more effecting doping. The novel ruthenium complex is characterized by NMR, ESI MS, and XRD studies. We are also reporting a brief photophysical studies on the new ruthenium complexes.

### **P49. “Behaviors of Urban and Rural Squirrels and the Impact that Dependence on Anthropogenic Resources has on Microplastics and Microbes Found within Their Guts”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Alexa Smith, Rhaegan Kiland, Amelia Landsverk

Mentored by: Dr. Jennifer Sweatman

Rapid urbanization greatly impacts animal behaviors, largely by influencing foraging, as urban settings lack many of the resources that these animals depend on. This influence forces them to turn to anthropogenic materials and encourages more bold behaviors to ensure their survival. The behaviors of urban and rural Eastern Gray (*Sciurus carolinensis*) and Eastern Fox Squirrels (*S. niger*) may impact microplastic abundance and microbes found within their gastrointestinal tracts. This study seeks to determine if the feeding behaviors of urban and rural Gray and Fox Squirrels influence the number of microplastics and microbes existing in the gastrointestinal tract. An increased abundance of microplastics may impact the microbes within the gastrointestinal tract and result in detrimental effects on digestion, metabolism, immunity, and processes related to development and behavior. To assess squirrel behaviors with relation to anthropogenic food sources in an urban environment, camera traps were set up around garbage cans at Concordia College. Microplastic abundance in gut contents and (microbiome characteristics?) were assessed by conducting gut-content analyses on salvaged urban and rural Gray and Fox Squirrel carcasses. We hypothesize that all specimens sampled will contain microplastics and that urban-dwelling squirrels will contain a greater number of microplastics than rural squirrels; with no significant differences between Gray and Fox squirrels. Due to the differences in diets between rural and urban Gray and Fox Squirrels, we suspect that there will be a difference in microbes

## COSS 2023 – POSTER SESSIONS

found within the gastrointestinal tracts. We also hypothesize that the diets of rural squirrels, having a natural, plant-based diet, will have a more diverse microbiome than urban squirrels feeding on anthropogenic materials. The findings of the project will highlight the impact that certain behaviors have on gastrointestinal tracts and the overall health of Eastern Gray and Eastern Fox Squirrels.

### **P50. “Proximity of Dreys from Garbage Cans and Its Effects on Gray Squirrel (*Sciurus carolinensis*) Behaviors ”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Seema Mustafa, Al Sterling, Grace Henderson, Dhruvika Patel

Mentored by: Dr. Joseph Whittaker

As the human population has encroached on the natural world, many native species have been forced to adapt to living in an urban environment. At Concordia College, there is a large population of eastern gray squirrels, *Sciurus carolinensis*, living on campus in close proximity to the students and faculty. These squirrels have notably been known to frequently scavenge the dumpsters and trash bins located around campus, consuming food thrown away by students and staff. The experiment was established to investigate the relationship between the location of the gray squirrels’ dreys and the locations of human food waste. Trees, on a portion of the campus, were surveyed for squirrel nests, and the number of nests and proximity to the trash locations were recorded. To record qualitative assurance, cameras were positioned near high-traffic trash bins to record footage of squirrels. Although there was no strong correlation between the trash bins and squirrel drey proximity, the cameras confirmed that squirrels frequently take food out of the trash bins. The squirrels were observed to have chewed through the plastic food coverings and were found using the rooftops for transportation. In the future, further investigations may be implemented to examine microplastic ingestion in squirrels in urban versus rural areas; additionally, research on the usage of rooftops may also be considered.

### **P51. “Monitoring Eastern Gray Squirrel (*Sciurus carolinensis*) Drey Usage in Proximity to Anthropogenic Food Sources on an Urban College Campus”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Maia Lieske, Glory Godwin Lekashu, Amelia Landsverk, Amber Eken, McKenna Wangen

Mentored by: Dr. Joseph Whittaker

Squirrels (Order Rodentia, Family Sciuridae) are conspicuous members of the mammal community and have been successful in adapting to the urban landscape. Concordia College’s campus is home to Eastern Gray Squirrels (*Sciurus carolinensis*) who create nests, or dreys, in trees. The substantial human activity, accessibility of both natural and anthropogenic food sources, and availability of natural and anthropogenic drey sites make campus an ideal location for observing effects of urbanization on nesting and foraging habits of these squirrels. The convenience of alternate, anthropogenic food sources may influence where and how squirrels decide to nest, their occupancy and co-habitation patterns, as well as the patterns and techniques in which squirrels forage throughout the day. We monitored the usage, characteristics, locations, and density of gray squirrel dreys throughout campus. Dreys on campus were found most frequently in ash (*Fraxinus spp.*), but also regularly in elms (*Ulmus americana*), and



basswood (*Tilia americana*) trees. Using the number of dreys on campus, we used a previously established population estimate equation to approximate the grey squirrel population on our campus at about 2.35 squirrels/ha in 2022 and can compare this to previous years. Using ArcGIS, we will spatially analyze the dreys on campus to investigate the influence of garbage can locations on the choices of squirrel drey construction. Our hypothesis is that access to anthropogenic food sources will influence the nesting habits of urban squirrels, particularly by decreasing the distance between nesting areas and these food sources and increasing the number of dreys on non-food trees.

**P52. “Monitoring Urban Squirrel Activity and Foraging Habits in Proximity to Anthropogenic Food Sources in Eastern Gray Squirrels (*Sciurus carolinensis*), American Red Squirrels (*Tamiasciurus hudsonicus*), and Northern Flying Squirrels (*Glaucomys sabrinus*)”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Maia Lieske, Glory Godwin Lekashu, Amelia Landsverk

Mentored by: Dr. Joseph Whittaker

Urban development causes habitat fragmentation which can disrupt ecosystems and organisms that inhabit them. Through interruption of species movement, fragmentation causes species to react by modifying their behavior, habits, and specialization. Concordia College’s campus is home to Eastern Gray Squirrels (*Sciurus carolinensis*), American Red Squirrels (*Tamiasciurus hudsonicus*), and Northern Flying Squirrels (*Glaucomys sabrinus*). The large amount of human activity, accessibility of both natural and anthropogenic food sources, and availability of natural and anthropogenic nesting, or drey, sites make campus an ideal location for observing effects of urbanization on foraging habits and movement patterns of these squirrel species. The convenience of alternate, anthropogenic food sources may influence the patterns and techniques in which squirrels forage throughout the day. In order to analyze these effects, we used live-trapping and radio telemetry to track squirrels across campus and documented their locations and behavior. We will examine telemetry data from 2022 and location data going back to 2014 in comparison to the locations of different anthropogenic food sources and drey locations across campus. We also set up camera traps to document the frequency with which squirrels forage in garbage cans when campus is in and not in session. Our hypothesis is that access to anthropogenic food sources will influence the foraging habits of urban squirrels, particularly by increasing the interactions with these food sources, influencing their movement patterns and nest use.

**P53. “Knock Out of a Zebrafish Protein Coding Gene using CRISPR”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Laura Kotz

Mentored by: Dr. Carol Pratt

CRISPR is a new and revolutionary genetic technology that allows humans to edit a genome creating a single knockout mutation inactivating a gene or can be used to knockout and insert new genetic sequences. My goal in this study was to apply CRISPR in practical means by attempting to knock-out gene BX539307.1 on chromosome 22 of a Zebrafish genome. This gene codes for an insulin-like binding domain also called IGFBP. After the gene of interest was selected, a cut site was selected and primers

along with a specific complementary oligo segments were designed using bioinformatics. The gene of interest was amplified using PCR and oligo segments were annealed to create a single guide RNA specific to the gene. A positive single banded gel showed that the gene had successfully been isolated from the full genome. Nanodrop readings also confirmed that the single guide RNA had been transcribed correctly. Despite early successes, when the CRISPR assay was run all results were negative for Cas9 knock-out activity. Although this trial was unsuccessful, this research allows us to find flaws in current CRISPR protocols and attempt to adjust them for the future to make CRISPR technologies more accessible to emerging biologists.

### **P54. “Chemotherapy-Induced Cellular Senescence is Associated with Hallmarks of Cachexia”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Gabriel Hanson

Mentored by: Dr. Davis Englund

Cachexia is a debilitating wasting syndrome characterized by the loss of adipose tissue and skeletal muscle. In the context of cancer, cachexia is associated with fatigue, functional decline, poor quality of life, and mortality. Cancer cachexia is widely viewed as a consequence of metabolic imbalances, anorexia, and chemotherapy, but the underlying biological mechanisms remain unclear. The purpose of this study was to investigate the impact of chemotherapy alone on body composition and physical function, and the induction of cellular senescence, a biological process implicated in tissue deterioration and dysfunction. To this end, healthy mice were administered a chemotherapy regimen used for the treatment of colorectal cancer, comprised of 5-FU, leucovorin, irinotecan, referred to as FOLFIRI. We show FOLFIRI inhibits age-appropriate accumulation of fat mass and drives reductions in body weight, lean mass, muscle weight, and physical function compared to a vehicle intervention. Interestingly, FOLFIRI increased the expression of several well-established markers of cellular senescence in liver, fat, and diaphragm. Furthermore, our data suggest FOLFIRI increases the circulating concentrations of several proteins secreted by senescent cells as components of the senescence-associated secretory phenotype (SASP). These findings identify cellular senescence as a potential contributor to chemotherapy-induced cachexia and provide a foundation for future studies to assess the effects of interventions to eliminate senescent cells or suppress the SASP on preserving muscle mass and physical function.

### **P55. “Synthesis of Ruthenium-Based Compounds with Potential Chemotherapeutic Properties”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Briana Doyle, Karen Valencia Rivera

Mentored by: Dr. Chopper Krogstad

Metal-based compounds have long been prevalent as part of chemotherapeutic treatments against a variety of cancers. Cisplatin—a well-known anti-cancer drug in use since the 1970s, although highly effective at treating malignancies, often coincides with an extensive list of unpleasant side-effects. The side-effects caused by cisplatin stem from its aggressive but non-selective mode of action. Despite several decades of research, a similarly cytotoxic yet highly specified anti-cancer drug has yet to be

developed. Research conducted in 2002 reported the development of a ruthenium-based compound known as RAPTA. RAPTA and a multitude of RAPTA-like derivatives have since showed great promise given their differing modes of action and have ignited the path for understanding the cytotoxicity and anti-metastatic qualities of ruthenium-based compounds. This study sought to develop bis-RAPTA derivatives with potential to treat malignant growths via highly specified modes of action. Successful synthesis of multiple precursor compounds was achieved via two methods. These new compounds were then used to synthesize bis-RAPTA and oxalated bis-RAPTA derivatives. Compound purity was respectable given minimal purification efforts were performed. Findings from this research lay groundwork for potential success in the mass production of a variety of ruthenium-based binuclear structures.

### **P56. “Polar Bears in Texas: An Assessment of Underrepresented Critically Endangered Mammals in AZA-Accredited Zoos”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Emerson Ericksen, Kayla Adamek, Emily Anderson, Greta Duren

Mentored by: Dr. Jennifer Sweatman

Zoos have become important conservation partners and strive to provide quality care to the animals that they house. Maintaining proper temperature conditions is critical to quality care and increases animal well-being and reproduction, which can help with conservation efforts. The Association of Zoos and Aquariums (AZA) maintains the highest quality care standards and participation within their network indicates a strong commitment towards conservation and animal care. However, the general public is often not aware of the behind-the-scenes work that these institutions do due to misconceptions stemming from zoos' past unethical practices. This assessment focuses on AZA facilities within the United States and their temperature suitability for underrepresented critically endangered mammals. Secondly, the assessment aims to promote zoo conservation programs and practices that benefit underrepresented species. To determine where species would be best suited, ArcGIS Pro was used to overlay IUCN range data, temperature data, and AZA facility locations. Canva was used to create educational materials from the literature reviewed. Maps will be created depicting locations and their suitable species and educational pamphlets and posters will be distributed within the community to increase public awareness.

### **P57. “Maintaining Exotic Animals on a College Campus”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Peter Weinzierl

Mentored by: Dr. Karla Knutson

I'm taking English 267 this spring where I am writing an ethnography about the Exotic Animal Care and Husbandry club on the Concordia campus, because I have such a deep passion for wildlife and preserving it and I believe that is the mission of the EACH club and the people involved with it. Ethnography is the art of studying people and how they go about accomplishing tasks in their line of work or microculture they are in. The ethnographic approach to this assignment includes a methodology

involving over 2 hours a week of both detailed observations as well as 6 interviews conducted with members of the EACH club. This is allowing me to better acquaint myself with the members of this group as well as the animals they work with so that I might better understand the things that this club does for the campus and what they do for the bigger picture of wildlife conservation in the world. I'm looking to present my research as a part of an ongoing process to share what I've learned and why it's important to the students of Concordia.

### **P58. “Understanding Chitosan-Alginate Bioplastics Interactions with Food Dyes”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Theodore Eggen

Mentored by: Dr. Graeme Wyllie

Chitosan and alginate are both naturally occurring polysaccharides which have been used as components in a series of bioplastics which form the basis of a Course Based Undergraduate Research Experience at Concordia College. These Chitosan-alginate bioplastics can be prepared with the addition of commercial food dyes which have been found to release upon subsequent immersion in aqueous solvents. This work investigates specific aspects of the behavior of these chitosan-alginate bioplastics looking at bioplastic film preparation and formal release and uptake experiments. The extent of incorporation of a range of food dyes into the bioplastic which was previously unknown was determined. A new food dye, Green 3, which is structurally very similar to Blue 1, was investigated with the prediction of properties similar to Blue 1. The addition of multiple food dyes in the same bioplastic was also investigated to determine if the presence of two different dyes would affect the relative release of each other. Finally, the importance of solution mixing was identified as a significant variable in release experiments which will be critical for all future work relating to these bioplastics and their release and uptake of various food dyes.

### **P59. “Magnetic Characterization of Fe<sub>2</sub>O<sub>3</sub> Polymorphs”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Noah Halmar

Mentored by: Dr. Thelma Berquó

In the conversion process of iron minerals in nature, it is observed that there are several routes in the iron oxide system. The ferric oxide  $\epsilon$ -Fe<sub>2</sub>O<sub>3</sub> which is a polymorph of other well-known phases, such as  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> (hematite) and  $\gamma$ -Fe<sub>2</sub>O<sub>3</sub> (maghemite), is suggested to be formed as an intermediate phase during the conversion of maghemite to hematite at high temperatures. The  $\epsilon$ -Fe<sub>2</sub>O<sub>3</sub> has a characteristic high coercivity that is also found in some archeological materials. Laboratory-prepared samples were thermally treated in air atmosphere, in the temperature range of 600°C - 1200°C, inducing the formation of the Fe<sub>2</sub>O<sub>3</sub> polymorphs. The Mossbauer spectra at 300 K show the presence of hematite,  $\epsilon$ -Fe<sub>2</sub>O<sub>3</sub> and a paramagnetic Fe<sup>3+</sup> doublet as the main phases. High-temperature magnetization curves have a main drop of temperature near 500 K and a second one near 800 K, supporting the presence of  $\epsilon$ -Fe<sub>2</sub>O<sub>3</sub> and hematite, respectively. In addition, the samples show hysteresis loops with coercive force in the range of 0.5 - 1.2 T at 300 K. The presence of maghemite was not confirmed yet, but it is being investigated on samples annealed between 600°C and 900°C.

### **P60. “Development of a Mössbauer Fitting Software Using Python”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Elijah Heyer, Antonio Lyons

Mentored by: Dr. Luiz Manzoni

Mössbauer spectroscopy, an important technique to identify iron phases, is used in the physics department at Concordia College both in research and advanced teaching laboratories. However, our software to analyze Mössbauer spectra is outdated and there are no commercially available alternatives. Thus, our group developed a python software to plot and fit data from a Mössbauer spectrum using Lorentzian functions. The code can be used to fit simple spectra with only one component (doublet or sextet) and, from the fitted spectrum, we obtain the magnetic hyperfine field and isomer shift of the sample. Future developments will extend the code to spectra with multiple components as well as to obtain the quadrupole splitting of the samples.

### **P61. “Clean Water, Better Health - How Fargo City Water Treatment Plant”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Gabriella Castro

Mentored by: Dr. Alexander Aldrich

Thesis: The general public has a misconception that the purpose of water treatment plants is to purify water from contaminants caused by humans, and even so is not suitable for drinking. When in actuality, tap water in the F-M area is perfectly good for drinking and the contaminants that are detrimental to human health come from natural bacteria, natural chemicals, animals and run off from farms in the area. Approach/Methods: Research about what water treatment plants do, including their methods of filtration and standards for clean water, with a focus on the Fargo Water Treatment Plant. An interview was conducted with an employee of the Fargo Water treatment Plant. Results/Conclusions/Implications: Water treatment facilities have to filter out of our water are caused by natural environmental factors. Farms have also been making a great effort for over a decade to only use the amount of pesticide necessary to protect their crops, no excess, to decrease the concentration of pesticides in runoff that would end up in lakes and rivers. Significance: There is misleading information available that discusses the negative effects of human pollutants on water quality, though these pollutants are not good for aquatic ecosystems, they do not impact public health in terms of the water cleanliness in our homes.

### **P62. “Exploring Solutions to Eco-Anxiety at Concordia College”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Lauren Taylor, Delaney Claggett, Paul Sternhagen, Lydia Durrett

Mentored by: Dr. Jonathan Steinwand

The problem that our research would aim to address is the growing concern of eco-anxiety on Concordia’s campus. Eco-anxiety is a term that describes the anxiety that people feel due to the worsening climate and is often experienced by students who are constantly studying the dying climate. While researching the span of eco-anxiety on campus, we would also like to search for possible solutions

## COSS 2023 – POSTER SESSIONS

to this problem and the possibility of extending these solutions to Concordia's campus. Our hypothesis is that there is a large population of students on campus that experience some form of eco-anxiety and would benefit from eco-anxiety focused care or resources on campus. To complete this research, we will conduct a survey across campus to gauge the student's experiences with climate related anxiety and to judge their knowledge on the subject of eco-anxiety. We will also research potential solutions and sources of comfort as well as look at other colleges with eco-anxiety care being implemented on their campuses. Through doing this research we would hope to allow students to feel more aware of their eco-anxiety and feel comfortable talking about these feelings that are often ignored. We would also like to provide possible solutions that could be implemented at the College level such as eco-anxiety centered counseling or other resources to be provided to students facing this issue.

### **P63. "Climate changes impact on local Vermont ski areas"**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Henry Sipples

Mentored by: Dr. Jonathan Steinwand

Skiing is synonymous with Vermont and a large part of the state's culture. The ski industry is a great way to get Vermonters to notice and discuss climate change leading to greener policies in the state. Vermont has a small number of nonprofit ski hills which are both beneficial to skiing as an activity and the climate. On the other side of the spectrum, large destination ski resorts are harmful to the environment which in turn contributes to the cycle causing rising temperatures. Research on using sources on large scale ski resorts climate impact showing how small scale ski resorts are increasingly necessary for locals who are priced out of larger resorts. Original interviews were conducted with presidents of small scale, nonprofit, local Vermont ski resorts to assess the impact of climate change on these small ski resorts. A juxtaposition is present in that small ski areas are increasingly necessary for both their lower cost and impact on the environment compared to cooperate owned large scale resorts. But are brought to the brink of closure due to the fact that decrease in snow fall causes many resorts unable to be open more than a few select days a year without the use of snowmaking which is either too expensive or too difficult to maintain for nonprofit volunteer run areas. Concluding that action must be taken to protect these areas that increasingly necessary and at risk.

### **P64. "The Domination of Female-Portraying Baristas Versus Male-Portraying Baristas in the Coffee-Providing Industry"**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Natalie Wolf Kuchinski

Mentored by: Dr. Karla Knutson

In the emergence of individuals identifying as non-binary, gender fluid, or separate identities that differ from biological male and female, the service industry has been greatly impacted. Through the observation of individuals working as baristas in Starbucks and local coffee shops in the Fargo/Moorhead region, the domination of female-portraying baristas as compared to male-portraying baristas is presented. If the service industry has been dictated by the maternal characteristics that

## COSS 2023 – POSTER SESSIONS

female-portraying individuals display, then, the oppression of male-portraying individuals within the industry, particularly in the coffee-providing service, will be subdued. In an unknown publication distributed by Starbucks, the titled “Starbucks U.S. Workforce Demographics” states that throughout Starbucks locations in the United States, 69.2 percent of baristas are female, and 30.8 percent of baristas are male (Starbucks U.S. Workforce Demographics). The date that these statistics were collected is unknown, but the presence of female-portraying individuals in coffee shops is evident to customers throughout the region. Four Starbucks locations and three coffee shops in the Fargo/Moorhead region were selected. Observing on Tuesday and Thursday of each week, the locations alternate from Tuesday, March 6, 2023 to Thursday, April 27, 2023. The anticipated results from this ethnographic observation include, but do not limit to, the domination of female-portraying baristas in the coffee-providing industry as opposed to male-portraying individuals, the presence of non-binary, gender fluid, or separate non-biological male or female individuals within the industry, and the association between maternal features that a female-portraying individual may display to the comforting aspect of coffee shops.

### **P65. “Los Efectos del Cambio Climático en la Comunidad Shawi en la Selva Amazónica.”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Saela Fredricks

Mentored by: Dr. Fanny Roncal Ramirez

I will be researching the effects climate change has had, and will have, on the indigenous Shawi group that live in the Peruvian portion of the Amazon rainforest. I hope to show how the changing climate can negatively impact this indigenous population. In recent years, the Amazon rainforest has greatly suffered from the anthropological effects of climate change and global warming. I will be researching multiple ways which the Shawi are impacted, including deforestation, lack of water, the contamination of local soils and lands, and a significant decrease in available food sources. Health and wellbeing of indigenous groups is also directly correlated to climate change. Since the livelihood of this indigenous community rests on nature and climate, the current climate crisis has drastically exacerbated the negative situation currently occurring. As the West generally drives climate change, indigenous communities, such as the Shawi people of Peru, tend to feel the most negative effects, and usually are the most vulnerable. This research project will highlight those vulnerabilities, by studying multiple effects on the Shawi people, and the Peruvian Amazon rainforest as a whole. Interviews of Shawi people will also be implored to explore the first-person perspective of this continuing climate issue.

### **P66. “Compassionate Care at the Red River Women's Clinic”**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Jessica Miller

Mentored by: Dr. Karla Knutson

This semester I am doing an ethnography, which attempts to understand another group’s culture, of the Red River Women’s Clinic. Working with the Red River Women’s Clinic is a timely ethnography because of recent judicial decisions over the summer of 2022. My own interest in reproductive freedom, along

with my Women's and Gender Studies minor, creates a passionate approach to this project. My methods include spending roughly two hours a week at the clinic observing, interviewing, and participating. My notes are kept in a field journal where I write my observations from each visit and weekly, reflective commentaries. Because of the discovery-based nature of the research, I will have conclusions by COSS, but initial analysis leads to a focus on the compassionate care that is provided to patients at the Red River Women's Clinic. Implications of these findings include how this standard of care compares to other medical appointments and the ways that the medical field is not always guaranteed to provide compassionate, passionate, non-judgmental care like they do at the Red River Women's Clinic.

**P67. "Papua New Guinea: Cream of the Crop or Betting the Farm?"**

**Time:** 3:45 - 5:00 p.m. | **Session:** Poster 2 | **Location:** Centrum

Student Author(s): Jack Lanners

Mentored by: Dr. Nicholas Ellig

This case study investigates loss of arable land and lack of capital movement as two development issues that are complicating efforts to further development in Papua New Guinea. Furthering development is a requirement for Papua New Guinea in order to gain wealth, diversify markets, and become a stronger player in the global market. Qualitative and quantitative information is used to describe and explain the loss of arable land and lack of capital movement as development issues in Papua New Guinea. Hypotheses describing how loss of arable land and lack of capital movement are inversely related to furthering development in Papua New Guinea are tested using time-series indicator data. Evidence from the analysis and hypothesis tests support the conclusion that loss of arable land and lack of capital movement represent development issues in Papua New Guinea. The project offers a proposed action step for addressing one of these issues—loss of arable land—as well as summarizing the results of the study as a whole.



## COSS 2023 – POSTER SESSIONS

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**Time:** | **Session:** | **Location:** Centrum

Student Author(s):

Mentored by: