SCHOLARS AT THE CAPITOL
Celebrating undergraduate research
FEBRUARY 21, 2018
The 2018 Minnesota Private College Scholars at the Capitol showcases the work of 48 student researchers. Their 30 research projects address disciplines ranging from philosophy to nursing, chemistry to mechanical engineering — this breadth represents the wide range of opportunities at Minnesota private colleges.

Minnesota private colleges have a strong commitment to undergraduate research, which allows students to work directly with faculty. This research encourages students to explore disciplines that they may pursue as a career or in future education.
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How Foreign Relations Shaped the Racial Depiction of Asian Immigrants: Focusing on Newspaper Accounts

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In this study, we examined the shaping of the concept of race as a social and legal construct. Despite the evidence of race’s inconsistency, American society still has not been able to dismantle this concept along with the racial discrimination that stems from it. Race continues to play a prevalent role in our society, and is often explained as a natural occurrence (without any scientific evidence) caused by genetic and biological differences in order to justify legal policies with racial undertones. In this paper we looked at newspaper articles from the early 20th century containing the terms “race,” “color,” “Immigrant Bill,” or “Gentlemen’s Agreement.” From these articles, we obtained quotes that explained how immigrants were racially categorized and how not only the criteria for these categorizations change but also the categories themselves changed between the years. The analyses focused specifically on the changes in racial categorization of Asian immigrants, especially Japanese immigrants.
Easing Into a 4-year Institution as a STEM Transfer Student: “What Year Are You?”

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The demand for science, technology, engineering, and mathematics (STEM) professionals is growing. However, STEM students face barriers to degree completion, including financial need, lack of STEM momentum, and more. Transfer students face unique barriers including poor fit between their varied educational and life experiences and traditional institutional supports - exemplified by the varied responses to the question, “What year are you?”

This qualitative research study utilizes interviews and coded transcript analyses to explore fit between transfer students’ life circumstances and their experiences in a private liberal arts college. Findings suggest that finances, age, family, social identity, student goals, and college attributes may affect transfer students’ transition into traditional college environments. Students’ love of learning and excitement about their specific STEM area seemed motivational to their persistence and appeared to help them overcome lack of fit with traditional college structures. We conclude with recommendations for improved STEM transfer student support. This study was supported by National Science Foundation Grant No. 1565060.
A Question of Universals: The Palamite Controversy in the Byzantine Empire and the Nominalist/Realist Debate of Western Europe

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During the close of the High Middle Ages, the European world faced two great philosophical/theological debates. Western Europe was overtaken by the Nominalist/Realist debate, which challenged longstanding philosophical ideas about the world. The eastern Byzantine Empire was faced with the Palamite controversy, which threatened the traditional Greek understanding of theology. Some scholars suggest that the debate in the West caused the Eastern controversy, while others assert that the connection between the two events is superficial. A more balanced view is that while the nominalist/realist debate did not directly cause the Palamite Controversy, it did influence its origin and development.
The Victorian Commercialization of Death and Its Discontents

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DEPARTMENT  HISTORY

BETHANY LUTHERAN COLLEGE

The way a culture treats the topic of death is a good indication of what they value in life. The Victorians have been known for their stuffiness or emphasis on decorum. During the early part of the nineteenth century this was certainly the case. However, the Victorian attitudes toward death changed in their views of etiquette, class structure, and religion as the twentieth century approached.
Refueling the Hungry Brain: Nutritional Ketosis in the Treatment of Mild Cognitive Impairment

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Due to the increasing demand for effective interventions to prevent the devastation of Alzheimer’s disease (AD), this case highlights innovative research aimed at attenuating memory deficits by offering the brain an alternative fuel, ketone bodies. Memory assessments were administered to a 57-year-old female patient previously diagnosed with selective memory complaints (SMC), mild cognitive impairment (MCI), and metabolic syndrome (MetS) to determine baseline cognition. The intervention consisted of 12 weeks of nutritional ketogenesis, HIIT exercise, and Peak App. brain training. By the end of the program, the patient’s MCI had normalized and MetS was stabilized, as evidenced by normalized blood glucose and Triglyceride/HDL Ratio. The patient achieved significant increases on all cognitive assessments. Increased ketone metabolism is a strong predictor of improved memory and metabolic restoration.
Resveratrol Protects NIH3T3 Cells Against TNFa-induced Apoptosis

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BETHEL UNIVERSITY

Resveratrol (RSV) is an aromatic phytoalexin whose antioxidant and anti-inflammatory properties make it an ideal consideration for natural reduction of inflammation. It has been demonstrated that RSV pretreatment of the RAW 264.7 macrophage-like cell line inhibits the inflammatory effects of co-stimulation with IFNgamma and LPS. Because TNFa is produced downstream of IFN/LPS, the aim of this study was to determine if RSV reduces markers of inflammation in macrophages by inhibiting the secondary effects of TNFa. Preliminary experiments demonstrated that RAW 264.7 cells failed to respond when treated with TNFa alone or in combination with IFNgamma or LPS. However, it is well documented that NIH3T3 cells undergo apoptosis in response to co-stimulation with TNFa and cycloheximide. Therefore, the impact of RSV on TNFa-induced apoptosis in NIH3T3 cells was assessed. While studies have shown that high doses of RSV can induce apoptosis in other cell lines, our results suggest that increasing doses of RSV pretreatment can rescue NIH3T3 from TNFa dependent apoptosis as determined by chromatin condensation, caspase 3 activation, and phosphatidylserine translocation. This indicates that RSV may work in part by inhibiting TNFa responses.
Mai Xee Vang
AUGSBURG UNIVERSITY

Breanna Wilson
AUGSBURG UNIVERSITY
Showcasing undergraduate student research

Brittany Johnson, Claire Jensen and Megan Dennis (Gressenhall Farm and Workhouse Museum of Norfolk) CARLETON COLLEGE

Brittany Johnson CARLETON COLLEGE
Apprentices & Runaways: The Lives of Workhouse Children

STUDENTS CLAIRE JENSEN & BRITTANY JOHNSON

FACULTY ADVISOR SUSANNAH OTTAWAY

DEPARTMENT HISTORY

CARLETON COLLEGE

In the early nineteenth century House of Industry children were often assigned to daily work spinning skeins of yarn. Unlike other work positions at Forehoe and similar workhouses, the records of the spinners have survived. These children were often the youngest in the workhouse and their daily skein output was recorded every day, week upon week, for years. These same children occasionally appear in other workhouse account books as they are apprenticed to masters or mistresses - offering modern researchers a glimpse at the social and economic networks that were used in an attempt to lift children out of the poverty that had sent them to the workhouse in the first place. Our research seeks to understand the role that work ethic and the possibility of social and economic reward played in the surprisingly industrial setting of early nineteenth century House of Industry spinning rooms.
Cover of Solidago (Goldenrod) Species Affects Plant Species Richness in Restored Tallgrass Prairie

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DEPARTMENT BIOLOGY

CARLETON COLLEGE

The Carleton GRASS project prairie is a restored tallgrass prairie in which two dominant grasses, Androprogon geradii and Sorghastrum nutans, have been planted selectively. The goal of this project is to study the ecological impact of these two dominant plant species and their absence. However, since the prairie has been planted, portions have become dominated by Solidago species, particularly S. altissima. This has presented the unique opportunity to study the impact of these Solidago species on the ecology of tallgrass prairie ecosystems. Surveys of vegetation in this prairie have revealed several significant effects regarding Solidago species and their effects on prairie biodiversity. We found that plant species richness, as well as the effect of grass cover on plant species richness, declined with higher cover of Solidago species. These findings have implications for tallgrass prairie ecology and restoration, especially in the absence of dominant tallgrass species.
Adverse childhood experiences (ACEs) are defined as traumatic events occurring before age 18 – such as abuse, neglect, and mental illness in the home – that have the potential to create negative, long-lasting effects on health and well-being in adulthood. The current study examines whether social relations and self-compassion explain the relationship between high reports of adverse childhood experiences (ACEs) and poor levels of well-being in adulthood. Research has commonly looked at ACEs that occur in the home, but this study also seeks to understand the role that expanded ACEs, or ACEs occurring outside of the household (e.g., schools and community environments), affect well-being in emerging adulthood. I predict that expanded ACEs will have a stronger correlation with well-being than the correlation between conventional ACEs and well-being. If the hypotheses are supported, clinicians and mental health practitioners could help emerging adults with ACE histories improve their well-being by fostering and maintaining good social relations and self-compassion, and by screening for expanded ACEs.
Music and Climate Change: Integration and Enrichment in the Elementary Classroom

STUDENT  EMILY DECH

FACULTY ADVISOR  AMY GRINSTEINER

DEPARTMENT  EDUCATION

COLLEGE OF SAINT BENEDICT

Through a ten-week collaborative project with a third-grade classroom at Oakhill Elementary School in St. Cloud, I integrated music and science into the classroom and connected the content with the MN State English Language Standards related to writing and sharing student work. I designed and taught ten one-hour original, integrative lessons that blended classical music, science, and English language arts, used inquiry-based, differentiated instruction for diverse learners, scaffolded new material, and spiraled content together into a cohesive unit. Students discovered elements of music, listened to classical pieces inspired by nature, researched how these aspects of nature transformed due to climate change, and wrote about their findings both individually and as a group. The project culminated in a joint performance in which students presented their research findings and I performed classical piano music by Haydn, Debussy, and Dohnanyi. Giving students a chance to showcase what they had learned empowered students to use their voice to fight climate change.
Cortactin is an actin-binding protein associated with the progression of cancer. It is over-expressed in many cancers including melanoma, colorectal cancer, breast cancer and glioblastoma. Previous cortactin research focuses on its role in cellular migration and invasion. Currently, the published research of cortactin regulating cell migration has been inconsistent. This research used cortactin expressed in prokaryotic cells. Prokaryotic cells lack an endoplasmic reticulum (ER) and Golgi apparatus, which in turn reduces the protein modifications that cortactin will undergo. This research focused on expressing cortactin in mammalian cells. To our knowledge, we are the first to express cortactin in mammalian cells. This was achieved using Chinese hamster ovarian (CHO) cells. Cortactin produced by CHO cells was visualized on SDS-PAGE. Expressing cortactin in mammalian cells, enables studying the post translational modifications, such as glycosylation to gain a broader and deeper understanding of cortactin's role in cancer and its effects on migration.
Due to the growing diversity in America, culturally-competent health care is crucial to ensure equitable access to the best quality of care for all people. Vaccines are well understood as a prevention method to promote health and wellness. In Minnesota, lower rates of vaccination can leave communities vulnerable to outbreaks of measles. Measles is a highly contagious respiratory disease that is preventable through immunization. Public health data suggests that MMR vaccination rate for Somali children are lower than the general population. This summer, the measles outbreak in Somali children has shed light to health care disparity in this community. This study employed a literature review to analyze current health care policies that contribute to the issue of low MMR vaccination rates in children of Somali descent. Literature analysis indicates misconceptions of autism spectrum disorder in the Somali community as a significant factor in declining MMR vaccination rate for Somali children. This study explores effective interventions to increase vaccination rates through health care practices and community education attuned to the cultural norms of the Somali people.
Momentary Lapses of Attention: Implications for Working Memory Performance

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This study examined the role of internal lapses of attention on single feature (color, shape) and feature binding during a visual working memory (VWM) change detection task. It was hypothesized that these internal lapses of attention would impact VWM binding performance to a greater extent than performance for single features. In the experiment, participants were shown four colored shapes and were tested based on color, shape, or color-shape bindings shortly after each trial. Participants were randomly probed, “what were you just thinking about,” after the test probe phase throughout the experiment to examine the impact of internal lapses of attention on VWM performance. Results revealed lower levels of performance while participants were off-task or had “mind wandering” lapses of attention relative to on-task trials. There was, however, a reduction in performance between “on-task” and “mind wandering” trials during shape and binding test probes relative to color test probes. Thus, contrary to our predictions, momentary lapses of attention do not appear to be more detrimental for maintaining feature bindings relative to single-features in VWM.
Injury- and Age-Dependent increases in Thy-1 in the Rat Supraoptic Nucleus

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CONCORDIA COLLEGE

It is well understood that the mature brain has a reduced capacity for recovery following injury, unlike a younger brain. To this point, following injury, uninjured axons from the supraoptic nucleus (SON) undergo recovery in the 35-day-old rat, but not in 125-day-old rats. Therefore, it appears that within the SON there are age-related changes that preclude the older rat from recovering following injury. We compared protein levels of integrins and the Thy-1 integrin receptor in 35 and 125-day-old SON using Western blot analysis. Our results demonstrated that in the older SON, there was an increase in Thy-1 protein levels, which is thought to be an anti-sprouting factor. Altogether, our results suggest that the observed increase in Thy-1 protein levels in the SON with age may contribute to an environment that prevents the recovery from injury in the SON of an older rat.
Carriage and Characterization of a Common Bacterium, *Staphylococcus Aureus*, on the Campus of Concordia University, St. Paul by students Darian Wisecup & Dezaray White

CONCORDIA UNIVERSITY, ST. PAUL

Kaitlyn Dahlgren
BETHEL UNIVERSITY
Showcasing undergraduate student research
Novel 3D Printed Vessel with Air Permeable and Oxygen Releasing Polymer Sidings for Shell-less Chick Embryos Development

STUDENTS
COLTON BAUMLER, LAUREL CARLSON & BRIANNA HOLTMEIER

FACULTY ADVISOR MONG-LIN YANG

DEPARTMENT SCIENCE

CONCORDIA UNIVERSITY, ST PAUL

This project focuses on improving previously published shell-less culturing methods to better sustain ex ovo chick embryo development. Specifically, the culture vessel backbone was redesigned and custom made with a 3D printer to allow better surface area for chorioallantoic membrane manipulation as well as experimental observation. Next, to provide needed air permeability and oxygen supply, a thin layer of air permeable polymer mixed with oxygen-releasing chemical was applied as supporting sidings to the vessel. Our results show that this new vessel is able to support chicken embryo development past embryonic day 18 without the need of extra oxygen gas supplementation and provides a repeatable setup for ex ovo chick embryo model.
Carriage and Characterization of a Common Bacterium, *Staphylococcus Aureus*, on the Campus of Concordia University, St. Paul

STUDENTS  **DARIAN WISECUP & DEZARAY WHITE**

FACULTY ADVISORS  **AMANDA BROSNAHAN & TAYLOR MACH**

DEPARTMENT  **SCIENCE**

**CONCORDIA UNIVERSITY, ST. PAUL**

A team of 39 students has studied the nasal carriage rate of *Staphylococcus aureus* on the Concordia University - St. Paul campus during the past two years. Samples have been obtained from the anterior nares of 848 on-campus consenting adults.

Mannitol salt agar (MSA), colistin-nalidixic acid blood agar (CNA), DNase, coagulase, catalase, and Gram stain tests have indicated the presence of *S. aureus* in 185 of the 680 tested samples, a carriage rate of 27.2%. All *S. aureus* isolates undergo further characterization for methicillin resistance (MRSA) via Kirby-Bauer assay, and production of the following proteins involved in pathogenesis: alpha toxin (hemolysin), TSST-1, SEA, SEB, and SEC (superantigens). In order to understand the genetic distribution of these toxins the prevalence of the associated genes is also analyzed.
Dicamba, 3,6-dichloro-2-methoxybenzoic acid, is a post emergent herbicide, typically sprayed on corn and soybean crops across the U.S. under the commercial name Diablo. This research project explored the kinetics of the photodegradation of dicamba in aqueous solutions of different water quality, including differences in pH, natural organic matter (NOM concentrations), and dissolved oxygen concentrations. The overall rate was determined to be first order. Addition of the NOM had the largest impact on the rate of the reaction, showing decreasing rates with increasing NOM concentrations. The pH only had a moderate impact, with a higher rate at neutral pH, while the concentration of dissolved oxygen did not have an impact on the rate. Photoproducts were analyzed using UV-VIS and GC-MS. Through UV-VIS analysis two products may be present in solution after irradiation due to the presence of an isosbestic point. GC-MS data supports the theory of two photoproducts present in solution, dichlorophenol and dichloromethoxybenzene.
Quantifying Glacier Volume Change Using UAV-Derived Imagery and Structure from Motion Photogrammetry

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GUSTAVUS ADOLPHUS COLLEGE

Glaciers in the Tropical Andes, like those worldwide, are experiencing rapid ice volume loss due to climate change. Quantifying the rate of ice volume loss is important given their sensitivity to climate change and the importance of glacier meltwater for downstream human use. In this study we determined the rate of ice volume loss for a debris covered section of the Reschreiter Glacier and a portion of the clean ice tongue of the Hans Meyer Glacier on Volcán Chimborazo in Ecuador. Traditional geodetic approaches of measuring ice volume change, including the use of satellite-derived digital elevation models and airborne LIDAR, are difficult in this case due to the small size of Chimborazo’s glaciers, frequently cloudy conditions, and limited local resources. Instead, we obtained imagery with an Unmanned Aerial Vehicle (UAV) and processed this imagery using Structure from Motion photogrammetry. Our results are used to evaluate the role of elevation and debris cover as Chimborazo’s glaciers respond to climate change.
Envisioning the “Embryo Menace”: Reflections of Society, Disability, and Taboo in Rubella and Zika Virus Educational Posters

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HAMLINE UNIVERSITY

The rubella and Zika viruses were considered harmless until major outbreaks revealed their link to birth defects if contracted during pregnancy, triggering massive public health responses and educational campaigns. Dubbed an “embryo menace” by 1960s popular media, rubella now serves as a guide to Zika’s potential effects on social norms, especially for disabled people marked as “defective” and mothers marked with the consequences of abortions or care for disabled children. In this study, a sample of educational posters issued by public health agencies during both outbreaks were studied systematically using content analysis and historical comparative methods. Rubella posters dated from the 1960s-1980s, during peak prevention efforts, and Zika posters dated from 2015-2017, during the current global outbreak. Findings indicate persistent fear and hostility surrounding disabled children and intense pressure placed on mothers to have healthy babies. Such messages have stigmatizing implications extending beyond the management of rubella and Zika—implications which should be considered in future responses to health crises.
Paleoecological Investigation of the Effect of Rainbow Trout Predation on Zooplankton Body Size and Community Composition

STUDENTS  ANNA RIES & MICHAEL GILRAY

FACULTY ADVISOR  LEIF HEMBRE

DEPARTMENT  BIOLOGY

HAMLINE UNIVERSITY

Fisheries management practices have the potential to critically alter food web structure and cause lakes to become more eutrophic. Square Lake (Washington County, MN), annually stocked with rainbow trout (RBT) since 1981, has experienced a eutrophication trend (more algae, decreased water clarity) and predation by RBT on large-bodied zooplankton grazers (e.g., the crustacean Daphnia pulicaria) is hypothesized to be the cause. To investigate this, we initiated a paleoecological study in 2015 for which sediment cores were collected from Square Lake and a nearby reference lake of similar size and depth that has never been stocked with RBT. Cores were Pb210-dated and core sections were analyzed to assess whether the sizes and relative abundance of the D. pulicaria remains in Square Lake sediments have decreased in response to size-selective predation by RBT since 1981. Results of this study largely support these expectations and our findings will help to inform fisheries managers about the ecological impact of RBT stocking programs.
The Psychological Distance of Climate Change

STUDENTS  CHARLIE MANGAS & HANNAH HOFFMAN

FACULTY ADVISOR  CHRISTIE MANNING

DEPARTMENT  ENVIRONMENTAL STUDIES

MACALESTER COLLEGE

Despite increasing concern about climate change within the scientific community, some Minnesotans express low personal concern about the issue. Our research uses psychological methods to better understand why people respond to climate change the way they do, and to assess strategies to spur a stronger action-oriented response. We examine how people’s sense of psychological distance toward climate change varies depending on how the issue is presented. More specifically, we look at how psychological distance varies depending on who is described as suffering from the impacts of climate change (for example, people in Minnesota vs. Minnesota loons), and how similar or dissimilar that victim is to oneself. Our research suggests that people engage in rationalization or downplaying of the significance of climate impacts when faced with climate change suffering that is too close to themselves. This phenomenon is known as “psychological avoidance”. We will discuss how communicators can overcome this avoidance when talking about climate change.
Chronic stress is highly prevalent in the pre-healthcare college student population and is associated with various negative effects on mental, emotional, and physical health of individuals (Schneiderman, Ironson, & Siegel, 2005). Stress management, in the form of Mindfulness Meditation, may decrease psychological stress and anxiety and increase empathy, compassion, and mindfulness, which are beneficial in college and in later patient-provider relationships (Shapiro, Schwartz, & Bonner, 1998). The purpose of the present study is to examine the relationship between guided mindfulness meditation and stress reduction using a brief web-based intervention method. Factors affecting psychological health as well as biomarker health with be monitored. Heart rate variability (HRV) is an evidence-based physiological measure of biomarker stress (Shearer, Hunt, Chowdhury, & Nicol, 2016). The findings of the research will be valuable for participants on an individual psychological level by giving them a tool for reducing their stress and anxiety.
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GUSTAVUS ADOLPHUS COLLEGE

Josephine Kent
HAMLINE UNIVERSITY
Courtney Vanderheiden, Rose Maniates & Nuala Bobowski
ST. CATHERINE UNIVERSITY

Professor Leif Hembre & Josephine Ken HAMLINE UNIVERSITY
Japanese barberry, Berberis thunbergii, is an invasive shrub that is overpopulating forests across the United States. Areas infested with Japanese barberry are believed to have increased populations of blacklegged ticks (Ixodes scapularis) compared to non-infested areas. This is of concern as blacklegged ticks are vectors for microorganisms that cause human diseases. This study analyzed the impact Japanese barberry has on the blacklegged tick population in an ecosystem where Japanese barberry had only recently become established. Blacklegged ticks were collected from four transects (two with Japanese barberry and two without) in Southeastern Minnesota. The ticks in the leaf litter were collected using drag cloths. Small mammals, which are hosts of blacklegged ticks, were captured, and ticks were removed from the mammals. Results indicate that comparable numbers of ticks were collected from the leaf litter in areas with or without barberry. Whereas comparable numbers of mammals were trapped in all four transects, a greater number of ticks were collected off mammals captured in transects containing barberry compared to transects without barberry. Collectively these initial findings suggest that the blacklegged tick population size is greater in areas infested with Japanese barberry and this increase is in the subpopulation of ticks on host mammals.
The Expression of Glutathione S-Transferase isotypes, alpha, mu and pi, in Mice (Mus Musculus) Chronically Exposed to Atrazine

STUDENT ANALIESE SCHADLER

FACULTY ADVISOR DEBRA MARTIN

DEPARTMENT BIOLOGY

SAINT MARY’S UNIVERSITY OF MINNESOTA

Atrazine is a herbicide that has been found in local watersheds and drinking water at levels higher than the EPA recommended concentration of 3 parts per billion (ppb). This is of concern because numerous studies have concluded that atrazine negatively affects growth, development, immune and endocrine system functions in diverse organisms. The body’s method of ridding itself of atrazine depends on a family of detoxification enzymes called glutathione S-transferases (GST). There are three major isotypes of GST: µ, π and α. Previous research in fish has demonstrated that chronic exposure to atrazine decreased the enzymatic activity for the GSTµ isotype. The current study utilized male and female CD-1 mice (Mus musculus) (n = 20/group) that were chronically exposed to atrazine (0, 3, 30 ppb) via drinking water for 11 weeks. Analysis of GST enzyme activities was performed and for both the GSTµ and GSTα isotypes, statistically significant decreases in enzyme activity was observed between treatment groups and gender.
Twisted Involution Graphs

STUDENTS  EMMA HOLZBACH AND AUTUMN MORTENSON

FACULTY ADVISORS  DR. JESSIE LENARZ AND DR. KRISTINE PELATT

DEPARTMENT  MATHEMATICS

ST. CATHERINE UNIVERSITY

In advanced mathematics, we study abstract ideas and constructs for the joy of increasing the collective body of knowledge. Many of these ideas lead to applications, but the initial goal is only intellectual exploration. The study of extended symmetric spaces was motivated by questions in algebraic geometry and computer science. For any given involution $f$ the extended symmetric space is the collection of permutations $g$, so that $f(g)$ is the inverse of $g$. We studied an operation using generating sets of the alternating group. The alternating group consists of all even permutations, and generating sets are a collection of permutations that are building blocks of the group. With this operation, we produced graphs and examined their properties. We proved the number of edges connected to each vertex was related to the size of the generating set. We participated fully in mathematical research, editing code and learning to work creatively and collaboratively, preparing us for a future in the discipline.
Cola, Candy, and Cake, Oh My! Assessing Consumer Knowledge of Added Sugars

STUDENTS  COURTNEY VANDERHEIDEN & ROSE MANIATES

FACULTY ADVISOR  NUALA BOBOWSKI

DEPARTMENT  NUTRITION & EXERCISE SCIENCES

ST. CATHERINE UNIVERSITY

Dietary recommendations suggest no more than 10% of total daily calories come from added sugars, but intake for the average American adult is 14%. Currently, little is known about consumer knowledge of added sugars. The objective of this study was two-fold: 1) to evaluate consumers’ recognition of added sugars (which can be listed under 60 different names) in processed products, and 2) to determine the influence of the Nutrition Facts Panel (NFP) on consumers’ ability to select products for 3 meals and 2 snacks that together do not exceed the 10% recommendation. A two-part survey was distributed online to 620 adults living in the US. 85% of participants correctly identified all products containing added sugars, however, identification of individual sugars was dependent on sugar name. The NFP reduced added sugar content of selected products, but added sugars remained above the 10% recommendation regardless of condition. Results reinforce the need for continued research on how to effectively communicate nutrition information.
In this presentation, I defend the doctrine of divine timeless eternity by analyzing some of the key issues that have made this doctrine difficult to accept in recent years. Divine temporalists contend that one or more aspects of the traditional doctrine of divine timelessness are incoherent. However, I argue that divine temporalists have failed to reckon with Boethius’ well-known argument for eternalism. In light of this argument and the Platonic tradition that has informed it, a deeper insight into the nature of time itself and its intimate relationship with timeless eternity is possible. This result allows us to respond with some of the main criticisms raised against the doctrine of timeless eternity, e.g., the claim that a timelessly eternal being could have no causal or epistemological relationship with anything temporal. I conclude that the doctrine of timeless eternity is the right way to think about God and time.
Microglial Response to LPS in the Leech Central Nervous System

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Microglia respond to damage caused by mechanical injury and bacterial infection in both vertebrate and invertebrate nervous systems. Unfortunately, not much is known about the effects of bacterial infection on the migration and accumulation of microglia. This study examines whether the gram-negative bacterial antigen, LPS, affects microglial accumulation in leech nerve cords, and if LPS changes the microglial response in either healthy or damaged nerves. Medicinal leeches were dissected and their nerve cords were crushed, with or without LPS present, to examine these effects. Feulgen’s, propidium iodide and pen ink staining methods were used to view microglia nuclei and differentiate between other cell populations within the nerve cords. Finally, accumulation was quantified using hand and automatic counts from image and statistical analyses were conducted to compare accumulation across conditions. Results suggest LPS does not alter the accumulation of microglia when coupled with a mechanical crush in leech nerve cords.
Food insecurity impacts a significant proportion of individuals and families across the country. In urban areas, food insecure regions are characterized by a lack of full-service grocery stores. This project establishes a financially sustainable farmer’s market model for lower-income neighborhoods and assesses the apparent social impact of the farmer’s market. My research team and I surveyed community members at ten locations before and after the farmer’s market model was implemented. The surveys primarily asked participants to describe the surrounding area with three words or phrases and write them on a whiteboard. The responses were photographed and analyzed for a shift in word connotation from before and after market implementation.
The Effect of Bubble Size on Effervescent Atomization and Spray Stability

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UNIVERSITY OF ST. THOMAS

This mixed method study was completed to study the effect of bubble size on the spray characteristics of an air and water bubbly flow. The study that was conducted examined a GLR, gas-to-liquid ratio of 0.006 and 0.0012, a liquid flow rate of 2.3 liters-per-minute, and bubble sizes of diameter 0.619mm to 1.6mm. A high-speed camera was utilized to capture both the bubbles and the spray. Digital imaging processes in MATLAB were used to quantify bubble size information and spray characteristics including dark-core-length, spray angle, and spray break-up. As bubble size increases, the spray breakup becomes non-uniform. Gas-to-liquid ratio was found be an insignificant factor when determining the variables that have the greatest impact on bubble size and the spray characteristics at this GLR. Furthermore, it was discovered that the dark-core-length does not increase as the average bubble diameter increases, and the jet angle decreases as the average bubble diameter increases at the operating conditions.
Thank you to everyone who supported these projects and a special thanks to the entire Augsburg University team for their support of the Scholars at the Capitol event.
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