MINNESOTA UNDERGRADUATE SCHOLARS

Posters at St. Paul

February 26, 2015

Welcome

It is my pleasure to welcome students, faculty, staff, administrators, and government officials to the second Minnesota Undergraduate Scholars Posters at St. Paul. This scholarly event showcases the excellent undergraduate research that is happening across the Minnesota State Colleges and Universities system. This year, presentations will be conducted by 51 students representing seven Universities and three Community and Technical Colleges.

The purpose of this event is to provide undergraduate students the opportunity to share the results of their scholarly work with legislators and other leaders in state government. As you attend the poster session, you will see the many forms of undergraduate research that occur on several Minnesota State University and College campuses. The Council and I hope you gain an understanding of the tremendous impact that involvement in undergraduate research has on the lives of students.

The conference has been planned through the combined efforts of the Minnesota Undergraduate Scholars Council. The vision, commitment, and contributions of the Campus Coordinators have made this event possible. We are grateful to the faculty mentors for the time and energy they have invested into the education of these students. In addition, we would like to commend the student presenters for their creativity, determination, and commitment to excellence.

Sincerely,

Carlos J. Panahon, Acting Coordinator
MN Undergraduate Scholars Posters at St. Paul

MINNESOTA UNDERGRADUATE SCHOLARS

Minnesota Undergraduate Scholars is a consortium of institutions that supports the research, scholarly works and creative activity of undergraduates by providing avenues for funding, presentation resources and opportunities for undergraduates to present their work. We are committed to engaging undergraduate students throughout the Minnesota State Colleges and Universities system in scholarly activities that will enrich their collegiate experience, open doors to career opportunities and lead to a life-long love of learning.

Minnesota Undergraduate Scholars Council

Bemidji State University
Troy Gilbertson

Inver Hills Community College
David Higgins

Metropolitan State University
Jennifer Schultz

Minnesota State University, Mankato
Karla Lassonde (sabbatical)
Carlos Panahon (Acting Coordinator)

Minnesota State University, Moorhead
Oscar Flores

St. Cloud State University
Carrie Barth

Southwest Minnesota State University
Emily Deaver

Winona State University
Mingrui Zhang
Mike Delong

Participating Colleges & Universities

Bemidji State University

Inver Hills Community College

Metropolitan State University

Minneapolis Community and Technical College Minnesota

State University, Mankato

Minnesota State University, Moorhead

Rochester Community and Technical College

St. Cloud State University

Southwest Minnesota State University

Winona State University

Schedule of Events

Thursday, February 26

11:00am–12:30pm **Student Meetings with Legislators**

1:30pm–2:00pm **Registration**

- Conference Room B
- Food and Refreshments provided

2:00pm–4:00pm **Poster Session in Veterans Service Building**

Table of Contents

Minnesota State University, Mankato

Minnesota State University, Moorhead

Rochester Community and Technical College

Southwest Minnesota State University

St. Cloud State University

Winona State University

A Genetics Based Approach to Management and Stocking of Muskellunge

Douglas Zentner
Andrew Hafs & Loren Miller, Faculty Mentors
Bemidji State University

Fish stocking has long been used as a management tool among fisheries biologists and continues to be met with popular public opinion. Despite perceived simplicity, the full effects of stocking remain cryptic for many populations of fishes. Stocking has frequently been used to maintain/establish many successful Muskellunge (Esox masquinongy) populations. Coupled with other management practices the Minnesota Department of Natural Resources (MNDNR) has established Minnesota as a premier Muskellunge fishery. From 1958-2012 the MNDNR stocked three strains of Muskellunge in Big Mantrap Lake. The first from Shoepack Lake (hereafter Shoepack-strain) was used until the realization that they were not attaining the large sizes sought after by anglers. The MNDNR then made a statewide switch to a source from Wisconsin (hereafter Wisconsin-strain) before a decision was made to use a source from Leech lake (hereafter Leech-strain). Using 13 microsatellite markers, genetic contributions of each source population were estimated from samples taken between 1984-2013 in Big Mantrap Lake. Analysis of current and past genetic makeup of Big Mantrap Lake demonstrated a successful dilution of the Shoepack-strain as the Leech-strain dominated the genetic makeup of the most recent sample. This study reinforces the use of genetic information as a management tool in evaluating ancestry of stocked fish. The results found will help the MNDNR make management decisions related to size structure and genetic makeup of future Muskellunge populations.

Screening For Inhibitors of the Pro-Angiogenic GTPase TCL Using Split-Venus Reporter Proteins

Rebecca Florke
Michael Hamann, Faculty Mentor
Bemidji State University

GTPases are a category of proteins that often play a role in the complex signaling events occurring within a cell. TCL is a specific GTPase involved in signaling related to angiogenesis, the formation of new blood vessels, when it is activated and is implicated in the abnormal development of tumor vascularization. Therefore, TCL is a promising new target in anticancer treatments. In order to screen for inhibitors of TCL, a detection system was designed using the fluorescent protein Venus. The coding sequence for Venus was split to produce two non-fluorescent pieces of the Venus protein. TCL and PAK, a protein that selectively binds to the active form of TCL, were then genetically fused to the two Venus sequences. Since the two fragments of Venus regain fluorescence only when PAK interacts with activated TCL, a decrease or loss of fluorescence indicates that a compound has inhibitory activity.

The Effects of Three Land Management Regimes on Small Mammal Abundance at Grand Forks Air Force Base, North Dakota

Lynda LaFond
Elizabeth Rave, Faculty Mentor
Bemidji State University

We determined small mammal abundance in three differently managed habitats (restored prairie, old field, and hay field) at Grand Forks Air Force Base, ND, during summer 2014. After 9,000 trap nights, four species were captured: meadow vole (*Microtus pennsylvanicus*), *Peromyscus* spp., *Sorex* spp., and ermine (*Mustela erminea*). Relative density of small mammals (number of individuals per 100 trap nights) was highest in the restored prairie and lowest in the hay field. A Robel pole was used to determine vegetation height and density at the three sites. The restored prairie had the highest mean vegetation height and density, whereas the hay field had the lowest. Determining small mammal abundance in a variety of managed habitats at Grand Forks Air Force Base contributes to better management of natural resources and provides baseline data for future small mammal studies on the base.

The Efficacy of Artificial Nest Boxes near Bemidji, MN

Michael Schleif
Brian Hiller, Faculty Mentor
Bemidji State University

Artificial nest box programs are a commonly applied method to increase nesting sites for cavity nesting waterfowl species. These programs are also an important way to engage community-based conservation and youth groups. In the spring and fall of 2014 a total of 50 nest boxes (approximately 10% of the total) were monitored in the area around Bemidji, MN. We recorded box use and total effort (hours and miles driven) as means of estimating the efficiency of the program. All boxes were located on public land within 30 miles North and East of Bemidji, Minnesota. Boxes were cleaned in the spring in order to ensure that only one breeding season was accounted for when checked in the fall. During the fall cleaning, nest success was measured by number of membranes found in the box. It required 19.42 hours and 212.7 miles of driving to check the 50 boxes which produced 105 successful ducklings. The effort expended to clean out and check boxes resulted in five ducklings per hour and less than one duckling per mile driven. Based on our findings it may not be cost effective to maintain similar nest box programs.

Phage Hunters

Jennifer Luhman & Soden Ka
Heather Brient-Johnson, Faculty Mentor
Inver Hills Community College

Due to the overuse and misuse of antibiotics, there has been a huge increase in the number of antibiotic resistant bacterial infections. Unfortunately, current development of drugs for antibiotic resistant bacterial strains exists at a rate far too slow to be able to replace drugs that are no longer effective. This puts everyone's health at risk, especially those in hospital settings. Unlike antibiotics, which kill off all bacteria, including beneficial flora, phage are able to target and eliminate specific microbes, without the negative side effects associated with antibiotics. Bacteriophage are also unique in their ability to keep up with the mutation of microbes, continuing to be effective. S. Epidermidis has been classified by the National Nonsocomial Surveillance System Report as the most important pathogen involved in nonsocomial bloodstream and cardiovascular infections. Most often these infections occur in immuno-compromised patients with intravascular catheters. This research specifically targets the biofilm forming S. Epidermidis strain 12228 found in intravascular catheters. Through isolation and characterization of the phage found, we will be able to aid in the development of phage libraries. Because there has been minimal research in bacteriophage complimentary to strain 12228, these libraries will help build a vast resource for studying phage within the biomedical research community. With this research should come the development of alternative treatments to resistant infections, and prophylactic treatments to prevent the formation of biofilms.

Quantification of the Chytrid Fungus Batrachocytrium Dendrobatis (Bd) Among Amphibian Species near Inver Hills Community College

Amy Blise, Ana Martinez, Jack Bauer, & Sarah Kline
Lisa Tracy, Faculty Mentor
Inver Hills Community College

Amphibian populations worldwide have been declining due to chytridiomycosis, a disease resulting from Batrachochytrium dendrobatidis (Bd) infection. The declining populations of frogs also affects ecosystems. Frogs are important to the food chain, both as a prey and predator. One important food source for frogs is mosquitos, which are a disease vector insect which can transmit malaria. The decline of the frog populations can upset our fragile ecosystem. Bd invades the top layers of amphibian skin cells and causes thickening of the keratinized layer, which often times proves to be fatal for the host organism. Bd was found to be present in the ponds of Inver Hills Community College last year. Due to this discovery, we are attempting to further quantify the presence of Bd among various species. To do so, we collected samples from an additional twelve amphibians on the Inver Hills campus, including western chorus frogs and grey tree frogs. We swabbed the feet webbing and ventral drink patches and then extracted DNA from the samples. We tested for the presence of Bd in these samples by amplifying Bd DNA with polymerase chain reaction and visualizing Bd DNA with gel electrophoresis. In the spring, we plan to acquire more samples from a more varied selection of frog species to produce more conclusive data.

The Monster of Body Image Ideals and How It Affects Society Today

Christy Ohlrogge
David Higgins, Faculty Mentor
Inver Hills Community College

The research in this essay reflects the history and change of body image from the 1950's to today. Emphasis is shown in the dramatic view in current trends to be unhealthily thin or over-muscular. Key factors are how unrealistic and unattainable these ideals are for any person. In addition, this essay addresses the many effects that can come from immense change in body ideals, and how America specifically has been affected by the drastic flip in body image. What makes body image so prevalent today is how every person's confidence and ability to progress has become closely tied to the ideal image America has set for a person's body. Not only that, but the overwhelming pervasiveness of the ideal in every aspect of normal life- television, anyone? The skyrocketing of the diet industry is only one example of how it can spread from a person to something bigger, such as the economy. So what should this mean to the average person? Well, to anyone who has a daughter or son especially, children are growing up into this toxic environment of body dissatisfaction. Every year more and more children become dissatisfied with their bodies sooner, and even try to diet at a very young age- which can be extremely harmful during developmental stages. Otherwise, to each individual: the lengths a person must take to attain these images are extremely unhealthy, those who diet usually gain back the weight (and more), and many other important findings that make it hard to understand why human beings torture themselves to be beautiful to someone else's standards. The statistics are shocking, and it will only get worse. So what can America do? It's time for change. What effect can personal satisfaction have on life to the individual and to the whole? Turns out, it makes a world of a difference.

An Investigation of Employee Performance Appraisals: Increasing Accuracy, Reducing Bias, and Improving Outcomes for Individuals and Organizations

Michael Tracy
Jennifer L. Schultz, Faculty Mentor
Metropolitan State University

Performance evaluations serve a variety of aims. They are often used to assist management in making human capital decisions about promotions, transfers, and terminations. These evaluations also identify individual and organizational training and development needs. In general, they provide feedback to employees on how the organization views their performance and are often the basis for monetary and non-monetary reward allocations. However, polices, practices and processes that evaluate employee task outcomes, behaviors and traits are often fraught with problems such as inflated ratings, selective perceptions and stereotyping. This research project reviews the scholarly literature on performance management and provides solutions to firms and individuals on improving performance evaluation practices.

Beyond Aesthetics: Stephen Wiltshire's Art as Semantic Consideration for Qualitative Research in Autism

Hayley Guevara
Tammy Durant, Faculty Mentor
Metropolitan State University

Autistic savant artist Stephen Wiltshire is known for his dazzling cityscapes and aesthetically beautiful pieces. However, an analysis of Stephen Wiltshire's art proves that his pictures are not only valuable from an aesthetic standpoint, but rather are a tool for cognitive semantics—a lens into how an autistic savant constructs meaning. Researchers tend to focus on the quantitative aspects of autistic art, concerned only with concrete details such as orientation and veracity. Yet, Wiltshire's art yields a deeper interpretation when studied from a qualitative perspective. My presentation examines the research performed by psychologists Beate Hermelin and Neil O'Connor who sought to study the art of Stephen Wiltshire from a quantitative standpoint. I'll research this topic by performing a close analysis of the qualitative functions of Wiltshire's art, illustrating how Wiltshire's preoccupation with color and inclination to repeat certain objects, offers a visual representation of his autistic self-interest in a way statistical analysis never could. By performing a close study of Wiltshire's work, I will have a better understanding of how an autistic savant, cognitively constructs a unique perspective of the world, and in doing so, will gain a deeper understanding of an alternate way to view the world.

Determination of Sudan Dyes in Spices

Victoria N. Nguyen
Karyn M. Usher, Faculty Mentor
Metropolitan State University

Sudan Dyes are industrial dyes that are typically used in the manufacture of leather, plastics and other synthetic materials. In May of 2003, France published a report through the RASFF (Rapid Alert System for Food and Feed) that discussed the detection of Sudan I dye, a potential carcinogen, in dried spices produced in India. This was followed by a statement issued in 2009 by the European Union's Food Standard Agency warning the public that laboratory animals had developed cancer after exposure to this dye and the dye should not be considered safe to eat. Since then, many scientists and food agencies around the world have worked to develop efficient methods for the detection of these potentially carcinogenic dyes in spices. In the United States, food additives are regulated under the Food and Drug Administration's (FDA) Food Drug and Cosmetic Act (FD&C) which does not approve Sudan Dyes for use in foods. For this experiment, seasonings containing spices that have been previously found to be contaminated with Sudan dyes were chosen for this experiment. Popular brands of seasonings were purchased at supermarkets since they should not contain the Sudan dyes. The seasonings were spiked with known amounts of Sudan dyes and then a method was developed to extract the dyes and quantify them using High Performance Liquid Chromatography. This method, known as "Spike and Recovery", is an accepted way for analytical chemists to validate an extraction method that can then be used for quality assurance.

Planting Fruit Trees in the "Motor City": Facilitating Eco-Identity and Community Development in Detroit, Michigan

Renae Charwood & Deanna Griffin
August Hoffman, Faculty Mentor
Metropolitan State University

The current study explores the relationship between eco-identity and a community development (fruit tree planting) project located in Detroit, MI. Student volunteers (n = 14) from three different campuses (Metropolitan State University, Inver Hills Community College and the University of Michigan Dearborn) participated in a one day event designed to plant fruit trees and vegetables for a nonprofit food cooperative (Eating Gardens). Eco-identity has been described by James Kelly (1971) as an essential step in understanding the needs of communities by focusing on several areas: a) Being able to make positive contributions to the community; b) Understanding the unique needs that communities often face; c) Experiencing an emotional closeness or "community connectedness" during the process of the community development project; d) Likelihood of continued community involvement; and e) Viewing community service work as an important activity. This qualitative study examined the responses of each participant relative to their perceptions of making positive contributions to the community. The project also explored how an ecologically-based gardening and fruit tree planting activity can help facilitate the development of eco-identity. After completing the community development project each participant was administered the Eco-Identity Community Service Questionnaire and interviewed regarding their overall experiences during the gardening activity. A Pearson Correlation determined significant correlations between better understanding of the needs of the community with making a positive contribution to the community ($r = .701$) and reporting a better sense of "connectedness to one's community" with a greater likelihood to participate in future CSW activities ($r = .679$).

Metal Resistance in Bacteria and its Application in Bioremediation

Victoria Krawiec, Shequaya Broadus, & Mathew Kortuem
Renu Kumar, Faculty Mentor
Minneapolis Community and Technical College

Heavy metal contamination from industrial activities contaminates waterways and soil, and can cause immediate and long-term health problems for humans, wildlife, and plant life. Different metals used in industries yield various amounts of waste in the environment. For example, Zinc is used widely in metallurgy to produce zinc-plated hardware. Lead is widely used in rechargeable batteries. Dr. Kumar's lab is working on bacteria isolated from industrially polluted environment around Mississippi river near recycling yard. These bacteria were resistant to multiple metals and antibiotics. We are exploring heavy-metal resistant bacteria that exhibited resistance to zinc and lead. These bacteria can resist high concentrations of zinc and lead by accumulating it on the surface. By understanding these bacteria and how they interact with these heavy metals, we may be able to develop technologies to more effectively or efficiently decontaminate soils and wastewater and thus can be used in bioremediation and metal reclamation.

A Critical Analysis of Media Images Depicting the New Athletic Body Ideal and One Woman's Experience with Them

Kelsey Mischke
Amy Sullivan, Faculty Mentor
Minnesota State University, Mankato

The ideal body type for women in the United States is morphing into one that not only requires a thin physique, but visible muscle definition and fitness. The athletic body type must still possesses feminine qualities such as large breasts, a smaller buttocks, and soft curves. Advertisements new level of perfection has been created by advertisements, fitness magazines, and internet memes have created a new level of perfection. However, this new ideal body type is still computer generated, created from parts of multiple women, and largely unobtainable. Since its emergence, little research has critically assessed these images and their effects of women's self-evaluations. A feminist perspective was used to determine what these advertisements, photographs, and memes are really conveying to women. A sample size of 30 advertisements was used and 16 patterns were identified such as extremely fit and thin bodies, emphasis on impossible levels of societally defined beauty, and the sexualization of the female body, among other patterns. Auto-ethnographic findings are expected to indicate that these images lead to participant's internalization and idolization, which resulted in feelings of shame, guilt, embarrassment, excessive exercising, and dieting in pursuit of this impossible physique. Though this study focused on a single woman's experience with these images, it has larger implications for women everywhere are seem relevant and applicable. Those who inevitably internalize these images may travel down similar paths of psychological discomfort leading to physical injury in pursuit of an impossible ideal. Education provided by this study could deter such harms and prevent psychological and biological issues associated with striving for this new ideal body type.

Ashton Bird, Visual Artist

Ashton Bird
Liz Miller, Faculty Mentor
Minnesota State University, Mankato

I create temporary site specific, interactive installation artwork that combines interdisciplinary fluency with disciplinary depth. Installation art is a site specific art form that creates an immersive environment inviting the viewer to look, participate, and draw conclusions based off their interactions. The idea is to generate feelings and memories. This form of art is contemporary, yet traditional. A traditional example could be the painting on the Sistine Chapel, which Michelangelo painted specifically for that ceiling. Its contemporary relevant could be created specifically for the dimensions of a room in the Guggenheim Museum or the Conkling Gallery located at Minnesota State University. The URC foundation grant has allowed me the ability to combine several suited material and explore relationships between medium and location. It has also allowed me to witness reactions of the participant as they interact within the environment I have created. My personal inspiration is from a near death experience and aesthetic influences pulled from avant-garde films of the 1920s, the theatrical antics that are present in Jikken Kobo's Experimental Workshop and large scale sculpture and installations done by contemporary artists Dana Al-Hadid, Alexa Horochowski and Erica Merchant. I explore the relationship of the metaphysical and its influence on the human experience.

Factors that Influence Changes in Cultural Competency among Undergraduate Students

Kwame Opoku Akyeampong
Elizabeth Sandell, Faculty Mentor
Minnesota State University, Mankato

Increasing diversity among the population of the United States suggests the need for professionals to develop intercultural competency (IC) no matter what their area of expertise. For this study, IC was defined as "the capability to accurately understand and adapt behavior to cultural difference and commonality" (Hammer and Bennett, 2010). An undergraduate education that emphasizes acceptance and adaptation to cultural differences can provide a foundation for success and impact throughout the world. Yet, fulfilling all the requirements for undergraduate education programs takes time and money, so it is incumbent on instructors to use teaching methodologies that facilitate IC while still addressing the content. This study examined the relationship between intentionally-designed teaching methodologies in a Human Relations course and changes in IC among more than 450 university undergraduate students between 2010 and 2014 at a medium-sized Midwestern public university. The study responded to this research question: What instructional strategies affect changes in the IC of undergraduates? Data was collected at the beginning and conclusion of the course to measure changes in IC that occurred as a result of the course experiences. Students completed the Intercultural Development Inventory, developed by Hammer and Bennett (1998, 2001.) The survey [based on Bennett's Developmental Model of Intercultural Sensitivity (1986)] identified five orientations toward cultural differences: unawareness/denial, polarization, minimization, acceptance, and adaptation. Data was analyzed according to several instructional variables (e.g., student participation in various instructional practices, such as cultural partnership, research team project, reading circles, blogging, service learning, special cultural events, etc.). Data was also analyzed about several non-instructional variables (e.g., gender, year in school, academic major, temperament type, communication style, etc.). The results of this study will encourage other instructors, professionals, and leaders to implement high-impact teaching methods that can foster IC in any content area of higher education.

How Do Additive Manufacturing Process Parameters Affect the Material Properties in Stainless Steel – Bronze Composite?

Michael Doyle
Kuldeep Agarwal, Faculty Mentor
Minnesota State University, Mankato

The aim of this research is to determine the effect of process parameters of Additive manufacturing based Stainless Steel 420 + Bronze parts on the mechanical properties such as tensile strength, yield strength and elastic modulus. Different process parameters such as layer thickness and part orientation during the binder jet process were varied. A full factorial design of experiments matrix was made by varying layer thicknesses and orientation angles. ASTM E8 standard was used for tensile testing of the specimen and the results were compared. The testing showed that different parameters affect the properties in different manner. Layer thickness was very important to the mechanical properties, while the part orientation had negligible effect. Based on various applications, different process parameters can be chosen to achieve the strength of a required component made by binder jetting of this material.

Complimentary, Necessary Parts of a Whole: The Gendered World of the Meskwaki, 1640-2014

Angella Voravong, Bret Salter, Carra Strader, Darcy Smith, Linnea Dahlquist, & Oleana Herron
Erik Gooding, Faculty Mentor
Minnesota State University, Moorhead

The Meskwaki people are a Central Algonquian group who currently reside on the Meskwaki Indian Settlement in east central Iowa. This paper is a synchronic discussion of Meskwaki gender from 1640-2013 that re-examines previous conclusions on Meskwaki gender in light of unpublished archival materials and recent fieldwork. Specifically we will address the previously assumed importance of patrilineal decent and the number of documented genders, as well as issues relating to marriage and divorce. These topics will be explicated through the Meskwaki cultural-philosophical concept of "balance," an ideal ingrained throughout all aspects of their culture.

Evaluating the Phosphorylation of the Na^+- H^+ Exchanger Isoform 1 to Identify Potential Therapeutic Targets for the Treatment of Lung Cancer

Molly Strong & Whitney Swanson
Mark Wallert, Faculty Mentor
Minnesota State University, Moorhead

The hallmarks of cancer are a collection of common phenotypic changes that define cancer development and progression. Two of these hallmarks, sustaining proliferative growth and the activation of invasion and metastasis, are regulated through changes in the secretion and signaling by a variety of growth factors and lipid mitogens. The Na+- H+ Exchanger Isoform 1 (NHE1) is an 815 amino acid transmembrane protein that regulates cell growth and migration. In our research, we focus on a series of cell membrane receptors that can activate four distinct protein kinases that phosphorylate NHE1 in five different locations. These kinases and the locations they phosphorylate NHE1 are: 1) Akt/Protein Kinase B which phosphorylates NHE1 at S648, 2) Rock which phosphorylates NHE1 at T653, 3) Rsk which phosphorylates NHE1 at S703, and 4) Erk which phosphorylates NHE1 at both S770 and S771. To evaluate the role of each of these phosphorylation sites in the regulation of cell proliferation and cell migration, we have created a series of cell lines each expressing human NHE1 with one of the phosphorylation sites mutated to an alanine, thus removing that ability for NHE1 to be phosphorylated at that location. We will present the impact of removal of these sites on cell proliferation and cell migration. The goal of this project is to identify the specific phosphorylation sites on NHE1 that regulate cancer progression and use them as therapeutic targets in the treatment of lung cancer.

The Impact of NAFTA: US Imports of Mexican Transportation Equipment

Jesse Leyk
Oscar Flores, Faculty Mentor
Minnesota State University, Moorhead

Nations are becoming more integrated, so trade competitiveness is becoming more important than ever. This paper describes the impact the North American Free Trade Agreement (NAFTA) has on U.S imports of transportation equipment from Mexico in a time series regression analysis. Other research finds evidence that NAFTA causes a trade creation between participating countries. Although the results of this research does not provide evidence to support NAFTA impacting U.S imports of Mexican transportation equipment, there is evidence that supports a possible trade diversion effect involving U.S imports of Japanese transportation equipment.

The Link between Science Fair Participation and Higher MCA III Science Scores, with Strategies to Increase Alignment of Science Fair with Minnesota Standards

Isaac Skalsky
Richard Lahti, Faculty Mentor
Minnesota State University, Moorhead

Science fair participation has faced a rapid decline nationwide over the last several years. A review of science fair literature reveals many negative editorial articles, but little research. These articles, and how their ideas spread, is examined. The research component shows the improved performance on the 8th grade MCA III Science exam for schools participating in science fair vs. schools that did not, based on an analysis of statewide MCA scores and regional science fair participation. When examined in isolation, science scores were 2.29 points higher, and passing rate (percent of students meeting the standard plus percent of students exceeding the standard) was almost 8 % higher (36.8% pass vs. 44.7%) in schools that participated in science fair at the regional level. Even when demographic variables including, but not limited to, percent free lunch, percent minority, and percent special education are accounted for, a smaller but statistically significant difference remains. Although the difference in raw scores was small (about one point), the difference in passing rate was still nearly 4% higher in schools that participated in science fair than in those that did not, after adjusting for other factors. We conclude with a review of Minnesota State Science Standards alignment. Science fair currently seems to emphasize free choice of student topic and approach, guaranteeing only minimal alignment with standards. However with minor adjustment to the way science projects are assigned in class, it would be possible to cover substantially more Nature of Science and Engineering benchmarks. This realignment is shown.

Development of Engaging Labs for the Two-Year College Curriculum

Allison Rogich & Benjamin Lucas
Heather Sklenicka, Faculty Mentor
Rochester Community and Technical College

Engaging students in chemistry labs early in their career is critical to their continued interest in the course and science as a whole. Engaging labs bring elements of the real world into the teaching classroom and allow students to make decisions about the lab as well as mistakes. Two current concentrations in our group include an esterification lab that provides insights into drug discovery, and expansion of a current photooxidation lab to explore pet food. Progress on these projects along with future goals will be presented.

Detecting Faces with Missing Features

Mark Jankowski
Scott Peterson, Faculty Mentor
Southwest Minnesota State University

The ability to identify faces is very important to human beings, in fact there is a very specific region in the brain that is responsible for the processing of faces. It is thought that human beings process the human face in a top-down scanning fashion, so accordingly the following experiment assumed that facial features would be recognized in order of their position on a human face. However, the eyebrows were thought to be least important due to their relative size on a face. This experiment looked to answer the question of which facial feature is most important in facial recognition. The importance of a facial feature was indicated by the reaction time to a face with a certain facial feature missing (e.g. quicker reaction time, the more important the feature is). The participants in the study were 13 SMSU students who had no problems with their vision. The participants were each given a computer test in which they indicated a scene or picture image was normal or non-normal. A scene contained 6 faces in a circular fashion with 1 face central. A normal scene had all normal faces (all features present) and a non-normal scene had one face that was non-normal (the exclusion of eyebrows, eyes, nose, or mouth). The results showed that faces with the eyes omitted were responded to quicker than any other facial feature. It was also shown that the mouth was responded to quicker than the nose, thus questioning past speculations on facial scanning.

Evaluation of the Intrinsic Surface Charge of a Layered Silicate Soil

Samantha Ritter
Frank Schindler, Emily Deaver, & Thomas Dilly, Faculty Mentors
Southwest Minnesota State University

Mining, manufacturing, and agricultural practices can add harmful metals to soil affecting groundwater, plants, and animals. The fate and bioavailability of heavy metals is dependent on adsorption sites of clays. The objective of this study was to determine and relate the permanent structural charge, σo, of a mixed-layer soil silicate to that of a reference montmorillonite. The mixed-layer silicate was fractionated from a Nicolette clay loam following removal of soluble salts, organic matter, and iron oxides. The σo was determined by measuring outer- and inner-sphere complexation using the technique of Cs+ adsorption. Cesium ion concentration was determined by atomic absorption spectroscopy with ionization suppression. The σo of the Nicolette clay (0.55 cmolc kg-1 ± 0.072) was significantly higher (P = 0.04) than the reference montmorillonite (0.28 cmolc kg-1± 0.064). The Nicolette clay may contain higher tetrahedral charge and a propensity for adsorption of cationic species of lower hydration energy.

The Effects of Teleoanticipation on Power in Powerlifters

Christopher Ampe & Garrett Conn
Jeffrey Bell, Faculty Mentor
Southwest Minnesota State University

Teleoanticipation theory suggests athletes predetermine intensity and pace based off various cues before exercise onset. Teleoanticipation has been previously tested with cycling and running events, but not with weightlifting. This study sought to determine how teleoanticipation affects average power and average velocity during bench press of powerlifters. Seven powerlifters, all within 90th percentile of their 1 RM based on age norms and weight, were tested. Subjects were randomized to perform either short or long after control. Using a Tendo Power Analyzer Unit, subjects performed 3 sets of repetitions (6, 10, and 14) at 70% of 1 RM with perception of performing 10, but 2 sets suddenly increased/decreased. It was found that a decrease in power was attributed to a decrease in limb speed. No endspurt was detected in control nor short set; there appeared to be an endspurt in long set, but no significant differences were found in power (sig=.538) or velocity between control and long set (sig=.607). Average power control (PC) was 3.441 watts higher in control compared to average power long (PL) (sig=.018), average power short (PS) was 5.627 watts lower than average PL (sig=.002), average velocity control (VC) was 3.506 watts higher than average velocity short (VS) (sig=.017), and average VS was 5.494 watts lower than average velocity long (VL) (sig=.003). There were no significant differences between average PC and average PL nor average VC and average VL. In conclusion, testing at 70% of 1RM may be too high to see effects of teleoanticipation and endspurt in bench press.

Case Study: Ankle-Brachial Index in Postural Orthostatic Tachycardia Syndrome (POTS)

Annette Carr
Jeffrey Bell, Faculty Mentor
Southwest Minnesota State University

This study was conducted to determine effects of acute exercise on heart-rate and blood pressure in a case subject (CS) who has been diagnosed with Postural Orthostatic Tachycardia Syndrome (POTS). Due to the altered sympathetic nervous system function, heart-rate and blood-pressure responses were measured before and after upper-body and lower-body exercise. Twelve similarly aged controls (CON) were studied for comparison. Clinical criteria for POTS include sustained heart-rate increase of ≥ 30 beats per minute within 10 minutes of standing. After 5 minutes of standing, CS heart-rate increased from 83 to 114 bpm whereas CON heart rate increased from 75.83±12.15 to 90.58±10.48. Resting ankle-brachial index (ABI) in POTS compared to CON was lower (0.94 vs 1.08±0.08). Post-arm cycling ABI was higher (1.27 vs. 1.04±0.10) as was post-leg cycling (1.25 vs. 0.98±0.10). Therefore, acute exercise can increase ABI when sympathetic nervous function is compromised, but may decrease ABI when sympathetics function properly.

Analyzing the Pharmacological Effects of Picrotoxin in Regenerating and Intact Dugesia Tigrina (Planaria)

Ryan Thomas & Shruti Jagannathan
Latha Ramakrishnan, Faculty Mentor
St. Cloud State University

In the United States, epilepsy affects approximately 2.3 million adults and 467,711 children, with 150,000 new cases diagnosed annually. This condition is "a chronic neurological condition characterized by recurrent seizures." (Centers for Disease Control, 2013) With an idiopathic nature of epilepsy, further understanding and development in management of this condition is vital. This particular study is focused on analyzing regenerating planarians (Dugesia Tigrina) in comparison to the non-amputated worms, when exposed to a picrotoxin, a convulsant drug. The pSLM method was utilized in quantifying and analyzing the relationship between different epileptic drugs. This method involves subjecting individual planaria to increasing drug concentrations and quantifying the effectiveness of the drug by the type and number of seizures observed per minute, over a five-minute time period. (Rawls et.al). To date, this study is the first to analyze the effects of picrotoxin in regenerating planarian worms.

Computerized Application Training versus Speech-Language Therapy in Chronic Aphasia

Tiffany Smith
Grama Rangimani, Faculty Mentor
St. Cloud State University

Stroke survivors with aphasia often experience social isolation and decreased quality of life due to problems in communication. Most often, computerized cognitive applications (apps) training is used as an impairment-focused practice tool or in other forms to enhance communication and participation in society. This clinical case study examined the effects of Computerized Application Training versus Speech-Language Therapy in a stroke survivor with chronic expressive aphasia since 20+ years. While Speech-Language Therapy is beneficial for persons with chronic aphasia, the use of a computerized cognitive-linguistic app resulted in improvement of the client's auditory comprehension and naming abilities. The implications of treatment practice using technology, its utility value in stroke survivors with communication problems and challenges are discussed.

Design and Synthesis of a Novel Indanone Chemotherapeutic Agent

Sarah Hopfner
Mark Mechelke, Faculty Mentor
St. Cloud State University

In 2014, over 29,000 Minnesotans were diagnosed with cancer. From direct medical costs, to lost productivity, to its affects on personal relationships, cancer touches everyone. In an effort to alleviate this multifaceted issue, it is necessary to synthesize new and more effective chemotherapeutic agents. Natural products containing a-methylene g and d lactones in their structure have been shown to exhibit a wide range of bioactivity including cytotoxicity towards cancer cell lines. These compounds work by inhibiting a protein complex called NF-kB. The NF-kB protein plays a key role in cell division and has been found to be continuously active in cancer cells. Inhibiting phosphorylation of IKK, a protein in the NF-kB pathway, has been shown to suppress tumor growth by preventing NF-kB release into the cell nucleus. Using suspected natural and synthetic IKK inhibitors as templates, a novel a-methylene indanone is being synthesized. This compound is expected to prevent NF-kB activation, therefore inhibiting unregulated cell growth.

Discourse Therapy in Right Hemisphere Damage: A Case Study

Jessica Owens
Grama Rangimani, Faculty Mentor
St. Cloud State University

Adults with right hemisphere brain damage (RHD) frequently show difficulties in communication and other cognitive functions such as attention, memory, reasoning, and problem-solving. Particularly, they experience problems in a) emotional expression and comprehension; b) understanding non-literal language such as humor, implied meanings, and ambiguous words; and c) discourse comprehension and expression. These symptoms are associated with the inability to process coarse coding and suppression of meanings of words in language. Problems in either of these two areas affect an individual's ability to communicate effectively. In the recent past, research on "Contextual Constraint Treatment (CCT)", addressing coarse coding and suppression, has shown to facilitate improved language comprehension in adults with RHD. The objective of this study was to explore the utility of CCT in a clinical setting and contribute to the evidence-based practice in the field of speech language pathology.

(Still) Living in the Gray: (More) Lessons on Ethics from Prison

Hannah Johnson & Jenna Frain
Jana Craft, Faculty Mentor
Winona State University

The experiences of former business executives currently incarcerated for white-collar crime are often marginalized in the business ethics literature. Their lessons on ethics from prison can contribute valuable and rich information to the dialogue of business ethics. Expanding on the research by Craft (2013a), this study reveals continuity in additional responses from inmates that provided valuable insight into ethical decision-making. Data was collected from six questionnaires (n=6) which resulted in the reappearance of four major themes from the previous study: core values, ethical responsibility, ethics training, and ethical culture. Additional narrative responses were integrated with previous research within each theme.

Educating a Young Workforce: A Review of the Youth @ Work Initiative

Emily Belshan
Jana Craft, Faculty Mentor
Winona State University

As teenagers enter the workforce, employers may expect them to understand policies and procedures regarding sexual harassment. However, many teenagers lack mature judgment in the workplace because of their inexperience working in an adult setting. The types of jobs held by teenagers also tend to be part-time or seasonal with high turnover and employers often do not take the time to thoroughly explain an employee's rights and responsibilities. This oversight needs to be corrected in order to ensure the safety and well-being of the next generation of workers. This paper discusses the importance of sexual harassment education and awareness of today's working youth and examines the effectiveness of the Youth@Work initiative created in 2004 by the U.S. Equal Employment Opportunity Commission. A review of recent academic literature provided insight into existing and new programs to combat sexual harassment for this generation of workers. Further, this essay contributes to the literature by providing avenues for understanding the employment rights and reporting misconduct of teenagers, as it falls not only on employers, but teenage employees and their parents as well.

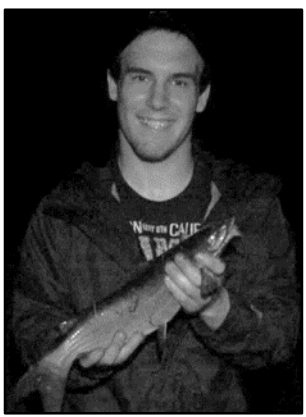
Exploiting Ebola Virus-Like Particles to Develop a Better Vaccine

Ashton L Krogman, Laura Zeamer, & Peng Yin
Osvaldo Martinez, Faculty Mentor
Winona State University

We hypothesize that virus-like particles (VLPs) which use the Ebola virus (EBOV) attachment glycoprotein (GP) and contain retinoic acid-inducible gene 1 (RIG-I) would enhance current and future vaccines. VLPs are morphologically and biochemically similar to parental virus, yet because they lack a genome and cannot replicate are safe enough to be used as vaccines. The EBOV GP determines in part, the tropism of the virus, leading to preferential infection of dendritic cells (DCs). Exploiting GP's ability to target DCs may enhance vaccine efficacy because EBOV VLP infection of DCs leads to DC activation, critical for the development of an effective immune response. EBOV VLPs are formed and secreted into the supernatant of cells transfected with EBOV VP40 matrix protein and GP expression plasmids. Recombinant chimeric constitutively active (ca)RIG-I-VP40 matrix genes were constructed in order to produce VLPs containing RIG-I. Activation of viral sensor RIG-I, induces the anti-viral interferon system. Expression of caRIG-I-VP40, but not VP40 in 293T cells induced activation of the interferon pathway, confirming that RIG-I activity in the chimeric construct was intact. To test if VLPs are secreted into the supernatant when caRIG-I-VP40 is expressed, supernatant from transfected cells were western blotted for expression of RIG-I. Preliminary evidence shows that RIG-I and VP40 are expressed in the supernatants of transfected cells suggesting successful VLP production. Future experiments will compare caRIG-I-VP40 and nonfunctional (na)RIG-I-VP40 VLP's ability to infect and activate human DCs.

Student Presenter Biographies and Pictures

Michael Schleif is a senior attending Bemidji State University. He is majoring in biology with an emphasis in wildlife management, and minoring in wetland ecology and geographic information systems. Michael plans to continue his education in wildlife, post undergraduate. Originally from Becker Minnesota, Michael gained an interest in wildlife and the outdoors from frequent visits to neighboring Sherburne National Wildlife Refuge. Michael's career goal is to be an avian biologist working with marsh birds and waterfowl.

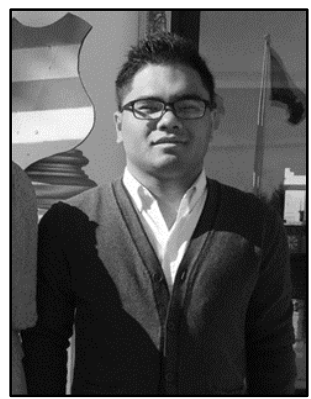


Originally from North Branch, Minnesota, **Douglas Zentner** came to Bemidji State University to study Aquatic Biology. Upon meeting Dr. Andrew Hafs he became interested in working with fish. He also found a love for working with genetics. Having the opportunity to work on this most recent project under the supervision of Dr. Loren Miller was a dream come true.

After graduating from Spencer High School (Iowa) in 2009, **Rebecca Florke** traveled to Mexico, South Africa, and Mozambique for an 8-month mission trip. She earned her A.A. degree from Iowa Lakes Community College in May 2011, transferred to Bemidji State University and received a B.A. in chemistry and a B.S. in biology with a medical sciences emphasis and a minor in psychology in May 2014. Currently, she is continuing her education at BSU in the M.S. biology program. In the near future, she plans to attend medical school to become a physician.

In 1999, **Lynda LaFond** joined the United States Air Force as a Weapons Load Technician on F-15 and F-16 aircraft. She remained on active duty until 2009 and during that time deployed to Iraq and Turkey. After active duty, she went to work for the 18 Civil Engineer Group in Okinawa, Japan. In 2011, Lynda returned to Minnesota and received two Bachelor degrees from Bemidji State University; Biology, wildlife management emphasis and Environmental Science with minors in biochemistry and toxicology. She is currently a graduate student of Biology at Bemidji State University.

Jennifer Luhman is currently in her freshmen year at Inver Hills Community College. Her studies are focused on the biological sciences. Jennifer particularly enjoys taking part in independent research based learning. In the future she hopes to pursue a career in the medical field, either as a P.A. or a Laboratory Scientist. In her free time Jennifer likes to spend time outdoors hiking and rock climbing. She also enjoys spending time leading her daughter's Daisy Girl Scout troop.



Soden Ka was born in Cambodia and grew up in Eagan, MN. After he graduated from Eagan High School, he attended Inver Hills Community College in Inver Grove Heights, MN and dreams of becoming a physician. His work ethic and leadership skills got him to become a president of International Student Club, member of V.I.B.E. Club and a senator for Student Senate on campus. While he was at IHCC, he had a work-study position as a student ambassador for the admission office. He is currently attending the University of Minnesota-Twin Cities, after he got his A.A. degree. He is a major in Biology, Society, and Environment (BSE). He is looking forward to go on to medical school.

Jack Bauer is enrolled at Inver-Hills Community College and plans to major in some area of Biology, most likely research. He's always loved science and the pursuit of knowledge as well as the natural world's diverse populations of life. When Jack is not doing homework or hanging out with my friends he likes to draw, read literature, and write. He joined this research project because he wanted to meet new people and gain valuable microbiological lab experience.

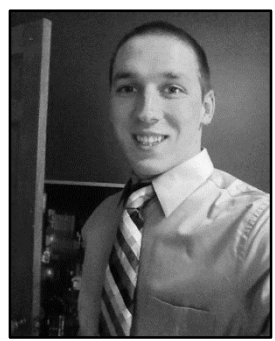
Sarah Cline is 21 years old and a student at Inver Hills Community College. Her activities outside of school include volunteering at the Wildlife Rehabilitation Center, snowmobiling, and fishing. Her intended major is Fisheries, Wildlife, and Conservation Biology. Her goal is to be able to work in the field and help animals by restoring and maintaining their habitat which will also benefit the health of surrounding communities.

Anabonita Martinez is a first-generation college student attending Inver Hills Community college. She is majoring in Biology and plans on continuing her education at a 4-year university afterwards. She believes our natural world is a place worth protecting and nourishing which is why she is pursuing a career in Biology and Environmental Sustainability. The *Batrachocytrium dendrobatidis (Bd)* research project caught her interest because it involves novel research and provides hands-on lab, field, and professional experience.

Christy Ohlrogge is a Political Psychology major finishing up her A.A. at Inver Hills Community College. She is the Co-President for the Alpha Omicron Beta Chapter of the International Honor Society of Phi Theta Kappa, as well as the South District Regional Vice President. Recently, she also became an International Scholar Laureate and will be going to Australia to study Medicine and Science. Her ultimate goal is to work at the White House, so she jumps at any opportunity to learn and improve-including this program!

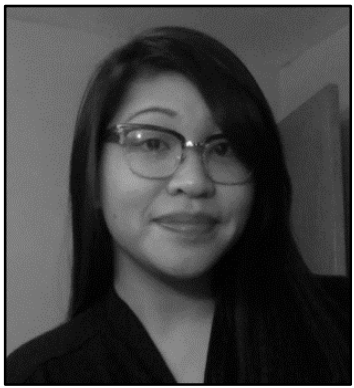
Hayley Guevara pursuing a Bachelor of Arts degree in English at Metropolitan State University and will graduate spring 2015. She has applied to the Masters of Education program at the University of Minnesota and hopes to become a high school English teacher. She is also pursuing a minor in creative writing, has published two technical writing pieces, and is currently working on a memoir. Her academic passions include the fields of literature, philosophy and art analysis. She is the mother to three spunky, curious children.

Michael Tracy attends Metropolitan State University and presented *An Investigation of Employee Performance Appraisals: Increasing Accuracy, Reducing Bias, and Improving Outcomes for Individuals and Organizations.*



Her American name is **Renae L. Charwood**, her Indian name is Ogitchidaw-kwe, which is Ojibwe for Warrior woman. (Named after her father Ogitchidawg, which means Warrior hunter). Renae is a single Native American female, 29 years old born and raised on the South Side of Minneapolis. She is an enrolled member of a federally recognized tribe called The Red Lake Band of Ojibwe. She has no kids and is in her fourth year as a Psychology major. She has less than a year left and plans on attending graduate school and keeping her options open as far as where. Attending Metro State has really changed her views and overall outlook on life. She has never been so committed to helping different communities and having a deeper understanding of the ways in which she is still learning.

Deanna Griffin is a 57 year old South Dakota native and returning student to Metro State, seeking a BA and eventually a Masters in Psychology and working with Veterans at the VA Medical Center. A graduate with a BA in Creative writing in 2000 from Metro State, she would like to combine writing with psychology to help veterans with PTSD. Deanna is a retired Sergeant First Class Veteran of the Minnesota Army National Guard and served in Kosovo from 2004 to 2005 and served in Doha, Qatar in support of Operation Enduring Freedom and Operation Iraqi Freedom in 2007 to 2008.



Victoria Nguyen attends Metropolitan State University and presented *Determination of Sudan Dyes in Spices.*

Kelsey Mischke is a senior Sociology major, minoring in Gender and Women's Studies and Psychology at Minnesota State University, Mankato. Following graduation in the spring of 2015, she plans on pursuing a PhD. in social psychology, continuing to focus on media, body image, and the sociology of sports. Her mentors are Dr. Emily Boyd and Dr. Amy Sullivan.

L to R: Shequaya Broadus, Victoria Krawiec, Mathew Korteum

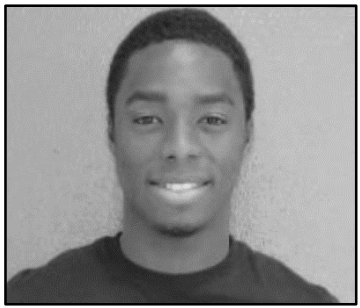
Shequaya Broadus attends Minneapolis Community and Technical College and presented *Metal Resistance in Bacteria and its Application in Bioremediation*.

Victoria Krawiec is a 23-year-old Minneapolis Community and Technical College student planning to major in Genetics and minor in Microbiology. She has a Biology A.S. and is enrolled in the Biotechnology and Chemistry programs at MCTC with anticipated graduation in spring, 2015. After graduation, she would like to pursue a future career in Genetics and further applied research.

Mathew Korteum earned an Associate's of Applied Science degree in Medical Laboratory Technology and a medical laboratory technician certification from the American Society for Clinical Pathology in 2012. He is currently continuing his education at Minneapolis Community and Technical College.

Ashton Bird grew up near Vermillion, South Dakota. Upon graduating high school, he moved to Mankato to attend Minnesota State University, Mankato. Ashton has recently graduated with his Bachelors of Fine Arts in Studio Ceramics. During his time at MSU, Mankato he was actively engaged in many opportunities that involve advocating for the arts and representing the school. While studying, Ashton was also creating and exhibiting a body of work that has been shown in both local and regional locations. His pursuit continues! Ashton wants to attend graduate school in the fall of 2015.

Michael Doyle has been inclined in many ways: mechanically, artistically, entrepreneurially, algebraically, and nanotechnologically. Michael attended the University of Minnesota through PSEO his senior year of high school. Next, he went to Dakota County Technical College for a Nanoscience Technology AAS. Now he attends Minnesota State University, Mankato for both a Manufacturing Engineering Technology bachelors and masters. He's advocated for students in higher education at the state and national capitols, taken gold and silver medals at regional and national competitions, and is currently independently researching many of his own prototypes.



Kwame Opoku Akyeampong is a Biomedical Sciences major at Minnesota State University, Mankato. He speaks English & French and is active in the MNSU Honors Society, Pre-Med Club, Minority Association of Pre-Med students, and Tri-beta Biological Honors Society. Opoku would like to pursue an MD/PhD degree because he enjoys studying about the human body and would like to do many impact-full things for people on a daily basis in the clinical side of medicine. However, he also enjoys research and would like to continue to conduct research in future. Opoku is the last of four boys.

Angela Voravong is a junior at Minnesota State University, Moorhead majoring in Anthropology with an emphasis on Cultural Anthropology. She is from Minneapolis, Minnesota.

Bret Salter is a sophomore and Minnesota State University of Moorhead majoring in Anthropology. He is from Glyndon, MN.

Cara Strader is a senior at Minnesota State University, Moorhead majoring in Cultural Anthropology. She is from Wheaton, MN.

Darcy Smith is a senior at Minnesota State University, Moorhead majoring in Anthropology with an emphasis in Cultural Anthropology. She is from the Spirit Lake Reservation in North Dakota.

Oleana Herron is from Blaine, Minnesota, originally. She is an English major at Minnesota State University, Moorhead in her junior year, minoring in Anthropology and earning a Certificate in Publication.

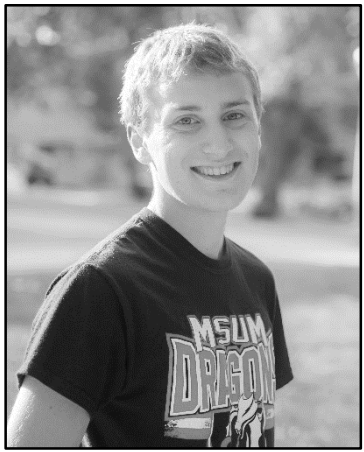
Linnea Dahlquist is from St. Paul, Minnesota and is currently a senior majoring in anthropology (cultural emphasis) at Minnesota State University, Moorhead.

Molly Strong is a senior Biochemistry and Biotechnology major from Woodbury, Minn. She will graduate in May 2016 and plans to pursue a career in medicine. Molly is a member of the soccer and track & field teams. She was honored as a member of the Northern Sun Intercollegiate Conference All-Academic Team both spring and fall semesters of 2015. Molly's research is sponsored in part through an American Society of Biochemistry and Molecular Biology Undergraduate Research Award which she received during the summer of 2014.

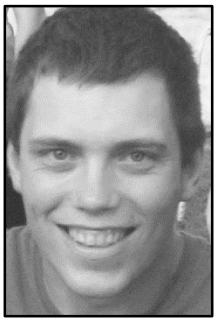
Whitney Swanson is a senior Biochemistry and Biotechnology major from Inver Grove Heights, Minn. She will graduate in May 2016 and plans to pursue a Ph.D. in Pharmacology and a career in translational research. Whitney is an active member and officer in the local chapter Beta Beta Beta, the National Biological Honor's Society. Whitney's research is funded in part through a Beta Beta Beta Research Scholarship which she received fall semester 2014.

Jesse Leyk attends Minnesota State University, Moorhead and presented ***The Impact of NAFTA: US Imports of Mexican Transportation Equipment***.

Isaac Skalsky is a sophomore studying chemistry and physics education at Minnesota State University Moorhead. In addition to completing this research on science fairs, he has participated in science fairs from the 3rd grade through his senior year of high school, eventually reaching international competitions (ISEF and I SWEEP). Since graduating high school he has also judged science fairs. Besides working on classwork and research, Isaac serves as a Dragon Ambassador, as a Dragon Mentor, and as a treasurer for collegiate FFA. Isaac grew up in St. Hilaire, MN and plans on teaching secondary science upon graduation.

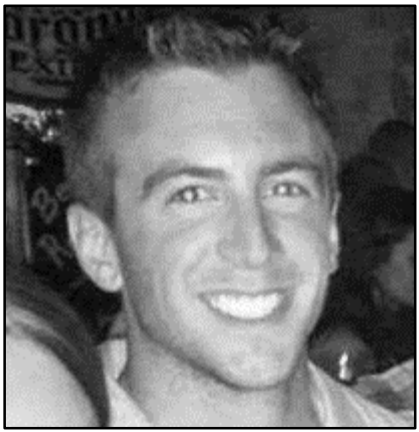


Ben Lucas grew up in southeastern Minnesota in the shadow of the Mayo Clinic. After high school he attended Northwestern College in St. Paul and graduated in 2008 with a bachelor's degree in accounting. Following this Ben worked for the CPA firm KPMG out of Minneapolis until he took a job with Mayo Clinic. While at Mayo Ben became interested in the practice side of the business and returned to school in the fall of 2013 to complete prerequisite courses required for medical professional graduate programs. When not studying, Ben enjoys the great outdoors, being active in his church and spending time with his wife.



Mark Jankowski graduated from Southwest Minnesota State University (SMSU) this past 2014 fall semester with a degree in psychology. He is planning on going to graduate school to study neuropsychology and or neuroscience. He hopes to study brain disorders during his graduate studies. He is currently living in his hometown of Forest Lake. Mark enjoys reading, playing board games, and spending time with family and friends.

Samantha Ritter is a senior Environmental Science major at Southwest Minnesota State University. Her hometown is Sauk Centre, MN. This past summer she completed a Research Experience for Undergraduates (REU) at Southern Illinois University. After graduation, she plans to pursue a master's degree in Environmental Science.

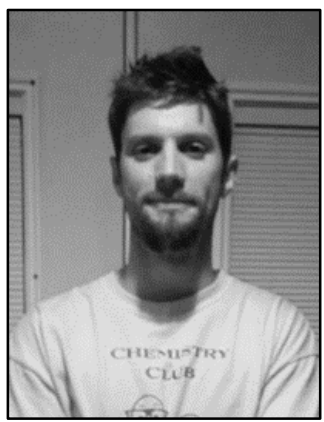


Garrett Conn is from Hutchinson, MN and is a senior at Southwest Minnesota State University. He is majoring in Exercise Science with a Coaching minor.

Chris Ampe is from St. Cloud, Minnesota and a student at Southwest Minnesota State University. He is an exercise science major in his final semester. After he finishes his Bachelor's Degree, he hopes to go back to school to get a Physical Therapist Assistant Associates degree. He would like to work in a VA hospital rehabbing wounded veterans back to health. He is an avid hunter and loves watching hockey, college and professional.

Three years ago **Annette Carr** decided to leave the workforce and enrolled at SMSU in as an Exercise Science major. She is currently a senior, and will graduate in December 2015. Before re-enrolling, she worked at a number of different jobs while raising three children with her husband Tom. She developed an interest in the benefits of exercise through her many life experiences, and is planning on working as a personal trainer. She wants to work with older clients to help them understand that exercise and healthy eating will help keep them active for many years. In her non-existent spare time, Annette enjoys golfing, reading and spending time with her family and grandson.

Ryan Thomas is a first-generation senior at SCSU researching Biochemistry. He discovered a love of science and Chemistry at St. Cloud State University and credits some of his success to the mentorship he found there, specifically from his research partner, Shruti. Ryan plans to work in public health and make a difference in as many lives as he can through dentistry.



Shruti Jannathan is a senior at St. Cloud State University majoring in Biomedical Science with a minor in Community Health. After graduation, she plans to pursue Dentistry with an emphasis in Public Health. In her third year as a Research assistant to Dr. Latha Ramakrishnan, Shruti has worked mainly on behavioral experiments related to Epilepsy with planarian flatworms. Apart from research, Shruti has been involved in many local organizations such as the Dream Center and the Union Gospel Mission Dental clinic, where she shares her passion for public health and dentistry, while providing educational awareness and promoting healthy lifestyle to the communities in Minnesota.

Tiffany Smith is a Senior Honors student at St. Cloud State University majoring in Communication Sciences and Disorders. She plans on attending graduate school to pursue a doctoral degree in Audiology. Tiffany was selected to present her research at The American Speech Hearing Association National Convention in Orlando, Florida, this past November.

Sarah Hopfner is a senior biochemistry student at St. Cloud State University. She has been conducting research on a novel indanone chemotherapeutic agent with Dr. Mark Mechelke since fall of 2014. Sarah currently serves as secretary for the SCSU chemistry club and works as a certified pharmacy technician. She is the recipient of the Darlene M. Carlson scholarship for Juniors in the Sciences. She plans to pursue a career in pharmacy or medicinal chemistry. Sarah resides in St. Cloud, Minnesota.

As a Communication Sciences and Disorders Major and Special Education Minor at St. Cloud State University, **Jessica Owens** aspires to be a positive influence in people's lives by pursuing an education in speech-language pathology. As an undergraduate student, she participated in three research studies involving right hemisphere brain damage, cognitive-linguistic applications and Wii programs, and computerized application training vs. speech-language therapy. Jessica was selected to be a poster presenter at the 2014 American Speech-Language-Hearing Association National Convention in Orlando, Florida and will be presenting a research study at the 2015 Minnesota Speech-Language-Hearing Convention this spring.

Hannah Johnson is a senior at Winona State University majoring in business administration and human resources, with a minor in management, and will be graduating in May 2015. She will complete her degree after three years in college. Hannah is from Wausau, WI and graduated from D. C. Everest High School. After graduating from Winona State, Hannah plans on moving somewhere in the Midwest and starting her career in human resources.

Jenna Frain is a senior, double majoring in Human Resources and Business Administration. After graduation in the spring she will be traveling to Europe with friends for a few weeks. After her return, she plans to look for a job with a company and work in Human Resources as a generalist. Eventually, she hopes to find a position specializing in training and development.

Emily Belshan is a student at Winona State University, double majoring in Business Administration and Human Resource Management. After graduating this spring, she hopes to gain work experience in human resources. She has a particular interest in compensation and benefits.

Laura Zeamer is from Jackson, Wisconsin where she grew up as the second of four girls. She currently attends Winona State University where she is pursuing a degree in Cell and Molecular Biology, conducting research, and playing volleyball. In her free time, she enjoys reading, cooking, and hiking the bluffs. After graduating in May she will attend the Master of Physician Assistant Program at the University of Wisconsin - La Crosse.

Peng Yin is an international student from China attending Winona State University. He is majoring in Biology with an emphasis in Allied Health and a Biochemistry minor. He loves the science of biology and biology in the medical field. He is currently looking for more experiences before going to medical school.

Ashton Krogman attends Winona State University and presented *Exploiting Ebola Virus-Like Particles to Develop a Better Vaccine.*

ST. CLOUD STATE
UNIVERSITY™

MINNESOTA STATE
UNIVERSITY
MANKATO

Metropolitan
State University

MINNESOTA STATE UNIVERSITY
MOORHEAD

Rochester
COMMUNITY AND TECHNICAL
College