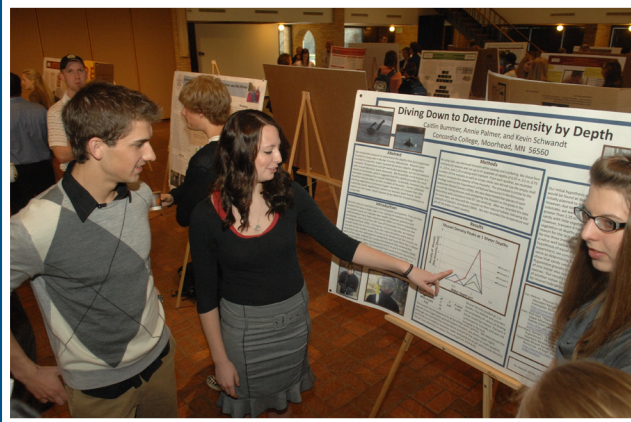


Concordia College Office of Undergraduate Research and Scholarship presents



# Celebration of Student Scholarship

6-9 p.m. Thursday, April 7  
8-10:20 a.m. Friday, April 8

CONCORDIA  
COLLEGE

# Schedule of Events

## Thursday, April 7

6-6:45 p.m.

### **Reception to Celebrate and Honor the Scholarly Accomplishments of Concordia Students**

Centrum, Knutson Campus Center

Brief presentations and awarding of the Ylvisaker Library Exemplary Research Paper and SGA Summer Research Fellows. Conference totes available to presenters. Refreshments will be served.

6:45-7:45 p.m.

### **Concurrent Session I – Papers and Performances**

#### **Morrie Jones Conference Center A**

##### **Theme: Environment**

6:45 p.m. Aesthetic experimentation in sustainable ceramics – Alison Harms

7:05 p.m. The greening of Concordia College – Nathaniel Cook, Erik George, Shane Sessions

7:25 p.m. European Education May Seminar – Heidi Michael

#### **Frances Frazier Comstock Theatre**

##### **Theme: Communication**

6:45 p.m. Indirect apologia: Walmart's public relations and advertising response – Lynlee Espeseth

7:05 p.m. The light within: Reclaiming the process of lament to find healing – Cosette Heigaard-McGurran

7:25 p.m. Theatre is "Artsy": Education, status, and the most effective factors for predicting theatre performance attendance trends – Rachel Brady

#### **Morrie Jones Conference Center B**

##### **Theme: Identity**

6:45 p.m. The Shavian woman: equal, better or wildly bewildering?: Boss Epifania dominates Shaw and his philosophy – Hannah Haegeland

7:05 p.m. A Brazilian in Paris: How Europe shaped Villa-Lobos' nationalism – Levi Kimmet

7:25 p.m. Presidential morality: The potential scandal of President John F. Kennedy in perspective – Taryn Brown

#### **Ivers 386**

##### **Theme: Body**

6:45 p.m. Making memories stick: Protein changes in the hippocampus are associated with memory formation – Briana Conrad, Joshua Watson

7:05 p.m. Sexual healing: Examining societal sexual repression and its role in the insanity of women in "The Yellow Wall-Paper" and "Portrait of a Madonna" – David Lemke

7:25 p.m. Utilization of multi-site directed mutagenesis in the development of Hp-FAR-1 loss-of-function mutants – Jarryd Campbell, Danielle Pinsonneault, Derek Berglund, Amanda Bakken, Michael Scheidt

#### **Christiansen Recital Hall**

##### **Theme: Relationships**

6:45 p.m. Broken up but not broken: Satisfaction, adjustment, and communication in post-dissolutional relationships – Stephanie Villella, Leah Ryan

7:05 p.m. Songs through the letters of Calamity Jane – Seana Johnson

7:25 p.m. Recovering vision: C.S. Lewis and Augustine on pride and humility – Kayla Goetz

*All sessions will be moderated by members of the Student Government Association.*

# Schedule of Events

8-9 p.m.

## Concurrent Session II – Papers and Performances

### Morrie Jones Conference Center A Theme: Environment

- 8 p.m. Educational awareness on the effects of bottled water and tap water – Erik George, Matthew Schmidt, Levi Sheff
- 8:20 p.m. Concordia College study away and environmental impacts – Maddison Melquist, Suzanna Robinson
- 8:40 p.m. Wetlands: An environmental education curriculum for upper elementary classrooms – Madison Engen, Jacob Hanson, Rachel Ward

### Christiansen Recital Hall Theme: Abstraction

- 8 p.m. Slaying space monsters with Shakespeare – Shelby Cochran
- 8:20 p.m. The Last Temptation of Christ: Doctrine by surreality – Nikoli Falenschek
- 8:40 p.m. Escaping the funhouse, or how to survive the corpse mines: Coping with hyper-awareness in the metafiction of John Barth and Kurt Vonnegut – Matthew Olson

### Morrie Jones Conference Center B Theme: Culture

- 8 p.m. Million dollar maybe?: The effect of female presence in movie on box office returns and critical appraisal – Melissa Lindquist, Julie Arnold
- 8:20 p.m. Cognitive advantages in bilinguals: The impact of language writing systems on visual working memory – Anna Ingebretson, Katie Zetah
- 8:40 p.m. 21st century war: A case study in fear of conflict – Skyler Vilt

### Frances Frazier Comstock Theatre Theme: Boundaries

- 8 p.m. Human hookworm: Disease of the poor. Efforts on the home-front to develop a cure, and the impact of relief programs overseas to eliminate suffering – Peace Eneh, Jarryd Campbell, Amanda Bakken, Megan Knox, Michael Schiedt
- 8:20 p.m. [constructed]: Challenging the artistic process – Hannah Holman
- 8:40 p.m. Interracial marriage: An investigation into the underlying factors that affect attitudes – Chloe Hinton

## Friday, April 8

8-9:20 a.m.

## Concurrent Sessions III – Papers and Presentations

### Morrie Jones Conference Center A Theme: Time

- 8:15 a.m. Building upon necessity: How Eugenia Berniaud Farmer, Julia Bullard Nelson and Theresa B. Peyton fought for woman's suffrage in Minnesota – Jenni Amis
- 8:35 a.m. Assessing gender and racial representation and stereotypes: Hollywood's portrayal of society – Laura Dunford, Jennifer Harvey, Jacob Johnson
- 8:55 a.m. Cultural criticism: A study of Matthew Arnold and Thomas Carlyle's approaches to 19th century industrial England – Ben Sand

### Morrie Jones Conference Center B Theme: Aesthetics and Perception

- 8:15 a.m. Keeping audiences in attendance: New music's place in regional orchestras – Peter Graff
- 8:35 a.m. Art and religion – Britta Johnson
- 8:55 a.m. Paper is patient: The role of ethnic newspapers in the assimilation of German-Russians in the Dakotas – Alexander Greff

9:20-10:20 a.m.

## Poster Session

Centrum, Knutson Campus Center

Morning coffee and treats available.

# Paper and Presentation Abstracts

*Abstracts are alphabetized by presenter.*

## 1. **Building upon necessity: How Eugenia Berniaud Farmer, Julia Bullard Nelson and Theresa B. Peyton fought for woman's suffrage in Minnesota**

Jenni Amis

Faculty Mentor: Jonathan Steinwand

Department: English

Eugenia Berniaud Farmer, Julia Bullard Nelson, and Theresa B. Peyton were three women within the Minnesota Woman's Suffrage Movement. These women of the post-Civil War era were not willing to return to the status quo, demanding that they too be given the same rights as their male counterparts; rights they felt were guaranteed them by the Fourteenth Amendment to the Constitution as citizens of the United States of America. Although previous scholarship has relegated Farmer, Nelson and Peyton to minor roles in the movement, these women served as three of Minnesota's pioneering suffragists. Their leadership was integral to the creation of state organizations, coordination of local conventions, and to the use of legal efforts to create an amendment to the state constitution. Their involvement was substantial and noteworthy, and for this reason modern scholars should not overlook their contributions.

## 2. **Theatre is "Artsy": Education, status, and the most effective factors for predicting theatre performance attendance trends**

Rachel Brady

Faculty Mentor: Andrew Lindner

Department: Sociology

This study addresses the plethora of recent research that aims to explain patterns related to arts attendance to then specifically unearth the most significant factors that predict theatre arts participation. Using U.S. General Social Survey data, I attempt to confirm established findings that show a link between education, income, age and theatre arts attendance. I also begin to address some contested themes within this field of research; namely the myth of the Omnivore, the argument between status and class as the most effective predictor of cultural participation, and the possible usefulness of childhood arts exposure as an arts attendance measure. I also introduce political views as a possible factor. Education, age, status are found to be the most important factors predicting an individual's likelihood to attend the theatre.

## 3. **Presidential Morality: The potential scandal of President John F. Kennedy in perspective**

Taryn Brown

Faculty Mentor: David Sandgren

Department: History

Since 1990, John F. Kennedy has consistently topped the polls for modern Presidents in handling their job. He became the centerpiece of a national ideal known as Camelot and had an impeccable image. In many ways, Kennedy set the standard for how the office of the President would change with the new forms of media and press. Although Kennedy seemed to be a man that could do wrong, he was far from perfect. Kennedy has been granted the title the most unfaithful man to ever inhabit the White House. He successfully avoided being exposed for his many illicit affairs during his time as President. Kennedy may have been able to dodge his own scandal, but other modern Presidents have not been as fortunate. William Jefferson Clinton and President Richard M. Nixon had each of their presidencies shaken by different types of scandal. From these scandals, we can put Kennedy's potential scandal in perspective.

## 4. **Utilization of multi-site directed mutagenesis in the development of Hp-FAR-1 loss-of-function mutants**

Jarryd Campbell, Danielle Pinsonneault, Derek Berglund, Amanda Bakken, Michael Scheidt

Faculty Mentor: Jennifer Bath

Department: Biology

Currently there are no commercially available vaccines against human hookworm. Our laboratory is investigating the use of a protein, Hp-FAR-1, discovered from *Heligmosomoides polygyrus*, a hookworm model used in mice. This protein comes from a family of proteins, the fatty acid and retinol binding proteins from nematodes, and can also serve to better understand FAR proteins present in human hookworm species. Recently (December 2009), the first x-ray crystallography image of a FAR protein was released, and interpretation of the image revealed that the protein contained two distinct binding pockets, P1 and P2, believed to bind fatty acids and retinol, respectively. Using this information, including the location of specific hydrophobic amino acids thought to line the pockets of P1 and P2, our laboratory constructed a series of site-directed mutagenesis experiments in an attempt to disrupt the binding of these ligands, to determine specifically which amino acids are essential for ligand binding. The resulting mutants were transformed into *E. coli*, recovered, and sequenced to obtain data on specific nucleotide, and therefore, amino acid mutations incorporated.

## 5. **Slaying space monsters with Shakespeare**

Shelby Cochran

Faculty Mentor: Jennifer Thomas

CSTA

I will be presenting my senior acting thesis. I portrayed the character of "Science Officer/Gloria" in the fall musical, *Return to the Forbidden Planet*. For the project, I kept a detailed journal of my experience and wrote a reflective paper describing the process after the production closed. The main theme of my paper ended up revolving around connecting the characters of Shakespeare that originated the dialogue I used within the production. By using comparisons of these characters from literature with the motives and tactics of my role, I was able to make sense of this rather un-researchable production. My presentation would include a brief description of my paper and project and a performance package complete with two short monologues and a song from the production.

## 6. **Making memories stick: Protein changes in the hippocampus are associated with memory formation**

Briana Conrad, Joshua Watson

Faculty Mentor: Mikel Olson

Department: Psychology

Learning and memory formation occur as a result of structural changes in neurons in the brain's hippocampus. We studied two proteins, Cortactin and Src, which are found in the dendritic spines of neurons and are involved in synaptic restructuring by assembly of new actin chains during memory formation. The present study examined changes in the levels of cortactin, p-cortactin, and p-Src in the rat hippocampus at various time points following both associative memory and spatial working memory formation. Analysis of hippocampal samples revealed significant changes in p-cortactin (but not p-Src) that were associated with the formation of both types of memory. However, the observed changes were not consistent across both tasks. Our findings indicate that spatial memory formation induced changes in p-cortactin levels that were disparate from the changes seen in associative memory formation. These observations are consistent with the existing literature. In short, our results suggest that structural regulatory protein concentrations are altered during memory formation. These findings are important because dendritic anomalies and memory impairments are seen in many neurological disorders.

## 7. The greening of Concordia College

Nathaniel Cook, Erik George, Shane Sessions  
Faculty Mentor: Peter Hovde  
Program: Environmental Studies

This presentation will outline the current position of environmental sustainability at Concordia, the college's unique position as an example for its community, the troubles associated with advancing sustainability, and the resiliency of the campus' Student Environmental Alliance (SEA). As three committed leaders of SEA, we have worked to organize and unify a student voice for environmental sustainability to transform the campus into a sustainable, environmentally literate community. By learning from nationally renowned "green" colleges and Concordia's own progress, we developed "The Greening of Concordia," a comprehensive analysis of Concordia College, which outlines and details a wide array of initiatives to bolster sustainability at Concordia, the strategies for effective implementation, and how the document may be used as a template by other campuses looking to "go green". We will also discuss the college's successes, what can be expected in the future, and our ability to create a nation-wide resilient sustainability movement.

## 8. Assessing gender and racial representation and stereotypes: Hollywood's portrayal of society

Laura Dunford, Jennifer Harvey, Jacob Johnson  
Faculty Mentor: Aileen Buslig  
Department: CSTA

Films earn millions of dollars each year in the box office and can have a large impact on their viewers. One way films alter perceptions is by underrepresenting females and minorities and reinforcing gender and racial stereotypes. As few studies have researched this phenomenon in recent years, the present study sought to discover if there has been any change in representation or stereotypes from 1969 to the present. Results show that overall, females and minorities were extremely underrepresented throughout the decades, but there was slight improvement as time passed. Also, male stereotypes were more likely to have a negative valence than female stereotypes throughout the decades, and females were portrayed less stereotypically than males.

## 9. Human hookworm: Disease of the poor. Efforts on the home-front to develop a cure, and the impact of relief programs overseas to eliminate suffering

Peace Eneh, Jarryd Campbell, Amanda Bakken, Megan Knox, Michael Schiedt  
Faculty Mentor: Jennifer Bath  
Department: Biology

Intestinal infection of hookworm is a prevalent problem in many impoverished countries of the southern hemisphere. Approximately two billion people, mostly women and children, are currently infected throughout the world. Preventative and treatment efforts have been made, such as the distribution of shoes and Mass Drug Administration (MDA) programs, to decrease the frequency of infection. However, these efforts have proven unsuccessful due to many factors. Data from survey done in Bangladesh demonstrate the complexity of controlling and eliminating soil transmitted helminths. Concluding efforts should incorporate additional measures for vaccine development, as well as modified educational efforts that are sensitive to (and in accordance with) the regions traditions and cultures. Vaccine development to prevent these neglected diseases are introduced as a potential worldwide solution to end the cycle of re-infection, as well as a low cost, permanent solution that would bypass most cultural conflicts and the increasing concern over drug resistance.

## 10. Wetlands: An environmental education curriculum for upper elementary classrooms

Madison Engen, Jacob Hanson, Rachel Ward  
Faculty Mentor: Michelle Marko  
Department: Biology

As technology increases in our world, fewer children are spending time outdoors creating a disconnect between kids and the environment that sustains them. This can have serious consequences not only on children's health, but on environmental health. We created a curriculum about wetlands for children in grades 4/5 to increase science education in classrooms. The lessons presented in this curriculum on biodiversity, ecosystems, flooding, pollution and farming are important environmental issues in the Midwest and worldwide. The curriculum consists of four lessons, each with a short lecture/discussion, activities, book lists and worksheets. The curriculum also has in-depth information about wetlands for teachers along with additional resources about books, videos and field trip possibilities. Each lesson meets specific state education standards. We will discuss whether student attitudes towards the environment were altered as a result of the first lesson in our curriculum and changes we made to the curriculum after using it in an actual classroom.

## 11. Indirect apologia: Walmart's public relations and advertising response

Lynlee Espeseth  
Faculty Mentor: Kirsten Theye  
Department: CSTA

Walmart, one of the largest retail chains in the world, is also one of the most controversial. Though complaints against the store are commonplace, Walmart rarely apologizes in a direct, public way for the many accusations made against it. They remain both popular and profitable despite the fact that the unanswered charges against the company are widely publicized through the media. One explanation is that Walmart is using another, less direct method to appeal to its customers and apologize for the wrongdoings of which it is accused. Despite frequent assertions that the best way to handle public criticism is through an immediate and direct apologia response, Walmart's reliance on a series of indirect apologia methods is remarkably effective. Analyzing Walmart's charity partnerships, news releases, and print and television advertisements in the light of traditional apologia scholarship creates a case study that helps to highlight why these methods are so effective.

## 12. The Last Temptation of Christ: Doctrine by surreality

Nikoli Falenschek  
Faculty Mentor: Peter Schultz  
Department: Art

Nikos Kazantzakis, in his novel, "The Last Temptation of Christ," uses surreal imagery as the means of expressing a complicated and paradoxical theology. When the divine manifests in the earthly, Kazantzakis is forced to consider human perceptions of this world and shape them into distorted reflections of themselves: the ground shakes, beings change form, angels and fire circle overhead, and dreams become reality. These surrealist images exist as windows into the unique theology that occupied the heart and mind of Nikos Kazantzakis. Influenced heavily by Nietzsche, Bergson, Buddha, and Christian doctrine, Kazantzakis developed a faith very different from mainstream Christianity, giving rise to much ridicule and social seclusion. My paper isolates the surreal images in "The Last Temptation of Christ" as divinely inspired caricatures of God's creation and textual transubstantiation. Insights into his philosophical and theological influences will provide a basis for better understanding symbology and process in Kazantzakis's writings.

### 13. Educational awareness on the effects of bottled water and tap water

Erik George, Matthew Schmidt, Levi Sheff  
Faculty Mentor: Michelle Marko  
Department: Biology

Municipal water quality provided by Moorhead's and Fargo's public service departments was evaluated in comparison to the water quality of popular bottled water brands. Water quality was evaluated for 10 parameters: atrazine, arsenic, copper, chlorine, fluoride, iron, lead, nitrate, sulfate, and total dissolved solids. These parameters were chosen for their relevance to local conditions and for possible health effects from their consumption. The results showed water quality from municipal sources are superior in comparison to bottled water. Aside from health concerns of municipal and bottled water, the environmental sustainability implications of water consumption are of great concern. In fact, the energy needed to produce and transport bottled water in the U.S. is equivalent to 54 million barrels of oil per year. In order to promote sustainability at Concordia, water bottle filling stations will be installed on campus to reduce bottled waste and provide superior water for the students to drink.

### 14. Recovering Vision: C.S. Lewis and Augustine on pride and humility

Kayla Goetz  
Faculty Mentor: Roy Hammerling  
Department: Religion

The original paper analyzes the central theme of pride and humility in each of C.S. Lewis's seven books in *The Chronicles of Narnia*, which is a key emphasis that has been neglected by scholars. Comparing Lewis's ideas with Augustine of Hippo's views on pride and humility shows that these opposing themes are primarily manifested in pairings of contrasting pivotal characters. Furthermore, this application of Augustine to the Narnia series reveals that Lewis, like Augustine, sees pride as essentially blindness to truth, others, and one's own traits, whereas humility is the ability to see more clearly one's own flaws and strengths, the needs of others, and one's proper position in relation to others and God. The above analysis reveals that pride and humility are central, though often subtle, themes that connect the series together as a unified whole. Since Lewis considered pride the most common and most deadly sin, it naturally emerged at the heart of his writings and stories, especially because he admitted that he himself struggled with pride during his lifetime. Lewis stated that all of his stories began with images in his mind, and his personal struggle with pride at the very least subconsciously influenced the way these images found their way into the texts he wrote and how he interpreted the images within his writings, manifesting his own struggles in the words and actions of the prideful characters while at the same time creating key heroic examples of the humility that he not only aspired to but encouraged others to emulate. The presentation will focus only on *The Lion, the Witch and the Wardrobe*.

Ylvisaker Library Exemplary Research Award Finalist

### 15. Keeping audiences in attendance: New music's place in regional orchestras

Peter Graff  
Faculty Mentor: Jean Hellner  
Department: Music

In his recent Wall Street Journal article, "The Zero Option" (12 June 2010), Terry Teachout questions the sustainability of civic orchestras, claiming that they must carefully program their concerts - a balance of "ultrafamiliar classics and soufflé-light pops" - in order to keep audiences in attendance. In response to this article, I investigate two regional semi-professional orchestras and their history of programming twentieth- and twenty-first-century compositions: the Fargo-Moorhead Symphony Orchestra and the Central Wisconsin Symphony Orchestra. In particular, I focus on the reception of new works by local critics, performers, and the composers themselves, whenever possible. Furthermore, I explore how these orchestras program new and sometimes challenging works of both local

and nationally known composers. The results show these orchestras do not need to adopt the programming that said article has suggested. New and twentieth-century works are vital components of the programming of these orchestras, and audience attendance has remained strong regardless.

Ylvisaker Library Exemplary Research Award Finalist

### 16. Paper is patient: The role of ethnic newspapers in the assimilation of German-Russians in the Dakotas

Alexander Greff  
Faculty Mentor: Richard Chapman  
Department: History

The history of the German-Russian ethnic community within the United States has been characterized by a retention of language and culture that is unique among immigrant groups of the 19th and early 20th Centuries. Through their retention of the German Language the German-Russian community can attribute much of their cultural preservation to an under-utilized and under analyzed source of primary documentation - the ethnic newspaper. That these ethnic newspapers played an important role in not only laying the foundations of early German-Russian communities in the United States, but in preserving many of the traditions which would bind these communities together, despite the efforts of the forces of Americanization; is a topic of particular importance to the ethno-historical scholarship on American immigration. As a window into understanding the adoption and regular use of the "American language and customs," the ethnic newspaper represents a great, untapped resource in the furthering of cultural understanding.

### 17. The Shavian woman: equal, better or wildly bewildering?: Boss Epifania dominates Shaw and his philosophy

Hannah Haegeland  
Faculty Mentor: Dawn Duncan  
Department: English  
Program: Global Studies

G.B. Shaw's "The Millionaire" introduces to the world a woman of striking mental prowess, economic expertise, a commanding presence - a soaring tower of strength. Shaw describes his purpose in writing as to "rais[e] a question that has troubled human life and moulded [sic] human society since the creation. The law is equal before all of us; but we are not all equal before the law" (175). He draws up an image of humanity divided into two vastly unequal groups: born bosses and "ordinary individuals who are helpless in their hands." Within this discussion of humanity we are presented with Shaw's superwoman, his paragon of superior ability, who wants a more perfect society. Throughout his career, Shaw's views on women are something of a mystery, with his personal and professional lives adding mud to the already murky lake of Shavian ideology. "The Millionaire" presents a femininity that was uniquely strong.

### 18. Aesthetic experimentation in sustainable ceramics

Alison Harms  
Faculty Mentor: Ross Hilgers  
Department: Art

Embracing sustainable art making techniques in ceramics is an unpredictable area of experimentation, which is not without its aesthetic risks. One of the most exciting and intense projects undertaken by the fall ceramics students is firing the wood-burning kiln. It is difficult to control the conditions to which the pieces are exposed to during this kind of firing, which allow for a range of unparalleled effects. This presentation will include an explanation of the current sustainable processes used in ceramics courses at Concordia, highlighting the wood-burning kiln and the creation of local slips. Additionally the talk will focus on aesthetic research in attempts to replicate surface effects achieved by application of Moorhead slip and the wood-burning kiln.

## 19. The light within: Reclaiming the process of lament to find healing

Cosette Heigaard-McGurran  
Faculty Mentor: Roy Hammerling  
Department: Religion

As many Anglo-Catholic and Protestant worship traditions trend away from use of lament the current framework of this type of scripture may be in need of expansion to include analysis of the process of lament in addition to its form and function. This paper combines psychological and theological scholarship to illustrate that when “reality acceptance” (as developed by Dr. Marsha Linehan) is applied to biblical lament text it is an effective method for reclaiming the process in lament that has been lost. This recovery is important because it enables healthy and productive coping for individuals and communities. Reality Acceptance will be presented and then linked to form and text. The reclamation of lament can rekindle an ability to embrace a full range of emotion within, not apart from, faith.

## 20. Interracial marriage: An investigation into the underlying factors that affect attitudes

Chloe Hinton  
Faculty Mentor: Andrew Lindner  
Department: Sociology

Interracial marriages are a particularly important indicator of how well racial groups interact and get along. And while interracial marriage is on the rise, studies show that there is still significant hostility towards interracial marriage and relationships. Age, race, gender, and education are among many traits that have been implicated as contributing factors to how people feel about interracial marriages. This study builds upon previous research by looking at how the interaction of gender and race can affect attitudes. The level of education obtained and how it affects attitudes will also be investigated. Data collected by the General Social Survey will be examined using multivariate regressions. Findings from the data show that the race-gender interaction affects opinions toward interracial marriage, as well as the level of education an individual receives.

## 21. [constructed]: Challenging the artistic process

Hannah Holman  
Faculty Mentor: Jennifer Thomas  
Department: CSTA

[constructed] is a theatrical exploration of the contemporary woman’s journey through societal limitations, expectations, and self-identification. The project seeks to challenge the theatre-making process, as well as themes of normal body image and inherent feminine identity. Although the final performance seems like a familiar theatre-going experience, the creation process was ground breaking. [constructed] began about two years ago without a title, script, or cast. While most senior theatre projects start with an already acclaimed text, mine grew out of an itch to deconstruct the way we approach the process of theatre-making. Through research in postmodern art-making, feminist theatre, devising, and community collaboration, I developed a set of language and tools for creation. After many drafts, the script turned out to be a potpourri of theatrical texts, poetry, feminist essays, interviews, and ensemble generated work. The rehearsal process was rich in movement, dialogue, and exploration.

## 22. Cognitive advantages in bilinguals: The impact of language writing systems on visual working memory

Anna Ingebretson, Katie Zetah  
Faculty Mentor: Susan Larson  
Department: Psychology

The current study investigated how language writing systems affect visual working memory in bilinguals. Alphabetic systems use a limited number of letters to convey sound, while logographic systems like Chinese use thousands of characters to communicate meaning. Because of the sheer volume of characters needed for even basic literacy, it has been hypothesized that Chinese and Japanese speakers may acquire superior visual memory abilities. We used three novel tests to evaluate visual working memory: a symbol-matching task derived from randomized Chinese characters, a picture-matching task, and a semantic

test to compare verbal abilities. Three groups of college students were evaluated: character-based language bilinguals (Chinese/Japanese), alphabetic language bilinguals, and American monolinguals. Chinese and Japanese bilinguals performed significantly better than other groups on the symbol-matching task while only out-performing alphabetic bilinguals on the picture-matching task. Our findings suggest that backgrounds in different writing systems may impact how individuals view and retain information.

## 23. Art and religion

Britta Johnson  
Faculty Mentor: Dawn Duncan  
Department: English

The journey from art to religion is a remarkable process captured by Alfred Tennyson in his elegy “In Memoriam,” a series of 131 poems depicting his emotional turmoil in the three years following the loss of his best friend Arthur Hallam. It outlines his transformation from non-religion and anguish immediately following Hallam’s death, to questioning, and finally to belief in God. Stephen Dedalus goes through quite a different journey in James Joyce’s novel *A Portrait of the Artist as a Young Man*. Dedalus was raised as a Catholic and attended Catholic school. He fell into sin and tried to cleanse his soul through strict mortifying of his senses. He eventually abandoned religious faith for art—his true calling. The journeys of these two men are quite compelling; yet when displayed against a very different, and quite opposite journey, the real subjectivity of the pathways of art and religion becomes clear.

## 24. Songs through the letters of Calamity Jane

Seana Johnson  
Faculty Mentor: Lucy Thrasher  
Department: Music

Rosa Luxemburg writes, “It is in the tiny struggles of individual peoples that the great movements of history are most truly observed.” Libby Larsen, a contemporary classical composer, honestly depicts just one of the multiple struggles in the life of the famous and true character of Calamity Jane. Her strange mannerisms such as wearing men’s clothing and drinking hard liquor for a lady of her time (1852-1903) made her a popular and intriguing woman during and after her life. In “Songs from Letters”, a song cycle by Libby Larsen, exact quotes are taken from the letters Calamity wrote to her daughter, and are placed in an atonal melody that creates a universe of a tough Western woman, her moments of vulnerability, but most importantly a woman ahead of her time. I will explore the controversy of whether Calamity’s daughter existed, the nickname of Calamity and how it was depicted through her life and the composition, and how to gather this information and perform it through a composition for voice and piano.

## 25. A Brazilian in Paris: How Europe shaped Villa-Lobos’ nationalism

Levi Kimmet  
Faculty Mentor: Jean Hellner  
Department: Music

Heitor Villa-Lobos is considered the composer responsible for the Brazilian nationalist movement. Listeners certainly are able to hear popular melodies and rhythmic styles influenced by Villa-Lobos’ interactions with the Brazilian chorões; however, during the early period of his career, the composer’s influence came largely from Europeans such as Debussy. Ironically, it would not be until Villa-Lobos left Brazil that a Brazilian nationalist movement would begin to truly unfold and a new Brazilian music would be discovered that stands as an exceptional example of nationalism. The primary focus of this paper, then, will be to examine the cultural factors that influenced Villa-Lobos’ transformation into a nationalist composer. This will be done through an examination of several biographies and through personal correspondences of the composer.

## 26. Sexual healing: Examining societal sexual repression and its role in the insanity of women in “The Yellow Wall-Paper” and “Portrait of a Madonna”

David Lemke

Faculty Mentor: James Postema

Department: English

In “The Yellow Wall-Paper” and “Portrait of a Madonna,” readers explore the minds of two women who have gone insane. This paper analyzes the role that sexual repression plays in driving the women insane. For the narrator in “The Yellow Wall-Paper” it is the rest cure devised by S. Wier Mitchell that confines her to her bed and causes her to eventually hallucinate a sexually freed woman running around the walls of her room. For Miss Collins in “Portrait of a Madonna,” a repressed sexual encounter in her youth continues to dominate her life even in her advanced age, eventually causing her to create a ruckus over a home invasion that she clearly imagined. My reading concentrates on examining what is absent from each text, specifically a sexual element, which reveals both the societal repression that exists on the characters and how the characters have rationalized the situation.

## 27. Million dollar maybe?: The effect of female presence in movie on box office returns and critical appraisal

Melissa Lindquist, Julie Arnold

Faculty Mentor: Andrew Lindner

Department: Sociology

The current study advances existing research by linking the depiction of gender in film with its impact on box office revenue and appraisal by movie critics. A content analysis of the top 100 box office grossing movies from 2000 to 2009 was conducted and full information was secured for 686 films. A measure of gender representation known as the Bechdel Test was used to assess movies for both the presence of multiple women and whether the women portrayed lead a life apart from men. A regression analysis was conducted to consider the effect of independent female presence on domestic box office revenue and critical consensus. The analysis also controlled for production budget, genres, whether the movie was a sequel, and if it contained a popular movie star. Results indicated that most movies do not feature an independent female presence and movies that do have one earn less at the box office. This effect appears to be largely the consequence of movies that feature women having smaller production budgets. We found no effect of independent female presence on critical appraisal. Although movies containing women with lives independent of men were relatively rare, controlling for production budget, films were not punished at the domestic box office for their portrayal of women.

## 28. Concordia College study away and environmental impacts

Maddison Melquist, Suzanna Robinson

Faculty Mentor: Michelle Marko

Department: Biology

Air travel, the primary mode of transportation for study away programs, is the leading cause of travel carbon emissions. Our research is an examination of the environmental consciousness of Concordia students regarding study away programs. We conducted a survey and analyzed the results to provide information about assessing a “green fee” for such programs. Our two main goals are 1) to establish a “green fee” without hindering study away participation and create an environmental fund from the fee to support various on- or off-campus sustainability projects; and 2) to educate Concordia students and faculty about the environmental implications of their travel experiences. Working with the Sustainability Task Force and the Global Education department, we hope to establish such a fee and create a curriculum to incorporate into the developing “Journey” program. Ideally, the fee will be used to fund projects that offset carbon emissions from traveling.

## 29. European Education May Seminar

Heidi Michel

Faculty Mentor: Karla Smart-Morstad

Department: Education

The final project for this May Seminar was to create a website that connected my travels and experience back to a first grade class back in the states in order to give the students insight into what it is like to be a kid and go to school in a different country. This website was updated daily during the trip along with a blog that the students and my family followed. The website also highlights one of the countries, Norway, that we visited and the first grade students created their very own Flat Stanleys so when I was in Norway I took pictures with them in various places and doing various activities. On my own I also created a scrapbook highlighting my blogs and pictures from each country.

## 30. Escaping the funhouse, or how to survive the corpse mines: Coping with hyper-awareness in the metafiction of John Barth and Kurt Vonnegut

Matthew Olson

Faculty Mentor: James Postema

Department: English

Metafiction is commonly defined as “self-reflexive fiction that examines the nature and status of fiction itself and often seeks to test fiction as a form” (Bedford). This type of fiction, frequently associated with postmodern literature, usually deals with a narrative style that either directly addresses the reader or directly comments on its status as fiction. Both John Barth and Kurt Vonnegut experiment to some degree with metafiction in their respective works, *Lost in the Funhouse* and *Slaughterhouse-Five*. Also present in both texts is the struggle to deal with a strong sense of awareness of the contemporary world. This paper will examine how both Barth’s *Lost in the Funhouse* and Vonnegut’s *Slaughterhouse-Five* employ the metafictional technique as a means to grapple with too much knowledge of the postmodern world.

## 31. Cultural criticism: A study of Matthew Arnold and Thomas Carlyle’s approaches to 19th century industrial England

Ben Sand

Faculty Mentor: Dawn Duncan

Department: English

The society of 19th century England and the cultural questions that arose as a result of rapid industrialization opened the door for various societal critics to interject their solutions into the national dialogue. The question of what is a quality life in an industrial society prompted both Matthew Arnold and Thomas Carlyle to develop their own notions concerning what is wrong with industrial society, the proper role of the state in an industrial society and the forces that drive society to ebb and flow in such ways that create such a dismal situation as the one experienced in 19th century England. Each man had his own style to confront these issues, whether it is through prose, poetry or historical analysis. Regardless of style, Matthew Arnold and Thomas Carlyle fervently and passionately promoted their ideals for English society throughout their works.

### **32. Broken up but not broken: Satisfaction, adjustment, and communication in post-dissolutional relationships**

Stephanie Vilella, Leah Ryan  
Faculty Mentor: Aileen Buslig  
Department: CSTA

The aim of this study was to examine adjustment, satisfaction, and the frequency of communication that occurs between ex-partners in post-dissolutional relationships. Participants (N = 239) were surveyed on their levels of satisfaction, adjustment to the break-up and communication with their most recent ex-romantic partner as a means to explore the process of redefining romantic relationships into platonic friendships. Results demonstrated that who initiated the break-up influenced levels of satisfaction and adjustment. Adjustment and frequency of communication were affected by whether ex-partners had moved on to a new romantic relationship. Differences were also observed between how males and females adjusted to break-ups. Though not predicted, additional results also showed that whether ex-partners remained friends with one another had an impact on post-dissolutional satisfaction and the frequency of communication.

Ylvisaker Library Exemplary Research Award Finalist

### **33. 21st century war: A case study in fear of conflict**

Skyler Vilt  
Faculty Mentor: Andrew Lindner  
Department: Sociology

We live in a world where international tension could spill into worldwide conflicts in the near future; this is also a world that is dominated by one superpower and largely free of the world-entangling conflicts that stained much of the 20th century. How do we account for contemporary considerations of future war? What factors play the largest role in how people come to believe in the immediacy of future war? Multiple studies have shown that education and general happiness levels play a role in people's beliefs but these variables alone don't serve fully explain people's considerations. What else can make a person optimistic or pessimistic for future conflict? Using data from several years of the General Social Survey, I will investigate what role social class, level of religious fundamentalism, and the age of the person play in future war considerations with the aim to further clarify people's beliefs.

## Undergraduate Research and Scholarship at Concordia College

At Concordia, students participate in groundbreaking research alongside distinguished faculty who are recognized leaders in their fields – NASA scientists, award-winning composers and writers, and international experts in religion and education. Programs to support undergraduate research and scholarship at Concordia College include Centennial Scholars Research Grants, the annual Student Lecture Series, funding to present work at NCUR and Scholars at the Capitol, and several other student research and scholarly travel grant programs. For more information, visit [www.ConcordiaCollege.edu/Academics/research1.php](http://www.ConcordiaCollege.edu/Academics/research1.php).

## Celebration of Student Scholarship

This annual event is an opportunity for students who have been involved in original, scholarly projects to present their work at a formal, campuswide academic event, and for other students to learn about the scope of research, scholarship and creative experiences they can become involved in while at Concordia. Students are encouraged to present posters, papers and performances that describe faculty-guided projects that were conducted at Concordia, work completed as part of an off-campus experience or other independent scholarly accomplishments.

# Poster Abstracts

## 1. iPod use among college students: A study of communication styles & personal involvement

Sasha Bergsagel, Rebecca Hovland, Paul Lillehaugen, Yvonne Zraggen  
Faculty Mentors: Stephanie Ahlfeldt, Lisa Sethre-Hofstad  
Department: CSTA, Psychology

The purpose of this study is to investigate the practices of iPod/MP3 player users relating to communication style and degree of involvement. A survey of college students (144 women and 53 men, mean age of 19.92) explored how iPod/MP3 players can be used for environmental control and avoidance of social interaction, as well as the relevance users assign to their iPods or MP3 players based on needs and interests. Overall involvement is not significantly correlated with unwillingness to communicate or using iPod/MP3 players as isolation tools. Anxiety about interpersonal encounters is significantly correlated with use of the iPod/MP3 player as an isolation device. These results contribute to discussion of the implications of iPod/MP3 player use on isolation and communication.

## 2. Effects of insect galls on resource allocation of *Solidago gigantea*

Tanner Bommersbach, Phillip Granley, Shane Sessions, McKenzie Smith  
Faculty Mentor: Laura Aldrich-Wolfe  
Department: Biology

Flies lay their larvae inside the stems of the perennial plant species *Solidago gigantea*, causing galls to form on the stem. The effect that gall formation has on a plant continues to be the target of much research. In this study, we sought to gain a better understanding of how resource allocation, a component of plant fitness, changes as a result of gall formation. Samples were collected in October 2010 at the Concordia College Field Station on the western shore of Long Lake, Becker County, MN. We found that resource allocation, as a function of biomass, changed in response to gall formation. Biomass allocation to inflorescences and leaves decreased as a result of the added energy requirement imposed by the gall. This decrease in photosynthetic and reproductive allocation could hinder the competitive ability of the plant over time.

## 3. Product inhibition of *Escherichia coli* NADPH-specific glutamate dehydrogenase by the inhibitors glutamate and NADP<sup>+</sup>

Joseph Bruenjes, Thomas Grindberg  
Faculty Mentor: David Mork  
Department: Chemistry

Glutamate dehydrogenase (GDH) is a biologically important enzyme in eukaryotes and prokaryotes for the assimilation of ammonia from the environment by glutamate synthesis. The synthesis of glutamate by reversible oxidative deamination produces a vital precursor in the synthesis of other amino acids and subsequent nitrogenous bases (eqn. 1) (Muhamad et al., 2011). (eqn. 1)  $\text{NH}_4^+ + \alpha\text{-Ketoglutarate} + \text{NADPH} + \text{H}^+ \leftrightarrow \text{NADP}^+ + \text{Glutamate} + \text{H}_2\text{O}$ . Both glutamate (Glu) and NADP<sup>+</sup> have been found to inhibit the nitrogen assimilation catalyzed by GDH. The inhibition pattern by Glu and NADP<sup>+</sup> is being determined by steady-state kinetics. A global study being conducted concurrently with fellow researchers aims to identify the overall enzymatic mechanism in both the forward and reverse direction.

## 4. Effectiveness of diabetes education on long term management of diabetes

Brittany Bruer  
Faculty Mentor: Albert Bartz  
Department: Psychology

Education can play a key role in helping a diabetic patient manage their diabetes. The role of a clinical educator is to inform the patient about healthy blood sugar levels, exercise and diet in order to keep their diabetes under control. This study researches the long term effectiveness of a diabetes educator in helping patients manage their diabetes over a two year span. Patient information was taken

during each doctor visit of their A1C levels. Our previous study indicated that the participants' A1C levels were reduced significantly after they had met with a diabetes educator. The results of this study indicate that there is still a significant difference with continued education for lower A1C levels. Diabetes education therefore is a promising aspect for management of diabetes.

## 5. Effects of weevil stocking on the density of Eurasian watermilfoil in Capitol and Indian Lakes

Laura Brutscher, Emily Lichte  
Faculty Mentor: Michelle Marko  
Department: Biology

Eurasian watermilfoil, *Myriophyllum spicatum*, is an invasive aquatic plant in North America that outcompetes and decreases native plant populations. The milfoil weevil, *Euhrychiopsis lecontei*, is a native insect that lives both on exotic and native watermilfoils and can be used to control further spread of Eurasian watermilfoil if present in sufficient densities. Effects of weevil stocking at Indian Lake in Millerton, NY, and Capitol Lake in Olympia, WA, were examined by collecting milfoil meristems and plant biomass samples throughout both lakes. Over the past four years of sampling in Indian Lake there has been a gradual decline in EWM and a fluctuation of weevil densities. At Capitol Lake, weevil populations were barely detectable one month post-stocking but significantly rose to roughly 0.23 weevils per stem one year post-stocking. Milfoil density has decreased since stocking, but this may be due a salt water infusion that has taken place in March, 2010.

## 6. Product inhibition of NADP<sup>+</sup>-specific glutamate dehydrogenase by $\alpha$ -ketoglutarate

Amber Chevalier, Logan Schmaltz, Anna Stasko  
Faculty Mentor: David Mork  
Department: Chemistry

We are investigating the product inhibition of *Escherichia coli* NADP<sup>+</sup>-specific glutamate dehydrogenase by  $\alpha$ -ketoglutarate ( $\alpha$ -KG) to determine the enzymatic mechanism for this reaction in *E. coli*. This requires determining the pattern of inhibition for each of the ligands for this enzyme. We have duplicated purification of the enzyme according to Lin and Reeves and are investigating the effects of glutamate, NADP<sup>+</sup>, and  $\alpha$ -KG on the kinetics. The results of this particular study show the inhibitory effects of  $\alpha$ -KG on glutamate dehydrogenase kinetics.

## 7. America vs. France: Who cares and why?

Briana Conrad, Danielle Dumonceaux, Miranda Markland  
Faculty Mentor: Gay Rawson  
Department: French

Ignorant. Selfish. Apathetic. These words describe many Americans in terms of their political involvement, especially in comparison with the French. From our studies and experiences in French we have noticed a striking difference between French and American political involvement, which intrigued us: Why do the French seem to care so much about what happens in their country and in the world while Americans appear content to remain ignorant? We investigated these perceived differences by conducting surveys and analyzing literature on French culture. We concluded that people who are not interested in the politics of their own country are unlikely to be interested in the politics of others. We feel this is especially true in the United States, thus our objective is to spark thoughts and conversations within the Concordia community about how we as individuals can become more active in our own political system, hopefully leading to greater global activism.

## 8. Changes in hippocampal phospho-cortactin protein levels after passive avoidance conditioning

Briana Conrad, Josh Watson, Charissa Quinlan  
Faculty Mentor: Mikel Olson  
Department: Psychology

Learning and memory formation occur as a result of structural changes in neurons in the brain's hippocampus. Cortactin and Src are two proteins involved in dendritic development of these neurons. The present study examined the changes in the levels of cortactin, p-cortactin, and p-Src in the rat hippocampus at various time points (5 minutes, 1 hour, 4 hours, 24 hours) following passive avoidance conditioning (PAC). PAC occurred when each subject entered a lit box and subsequently walked into a dark box where it received a small foot shock. Analysis of hippocampal samples revealed no significant differences in Src or total cortactin levels at any time point. Experimental groups had altered p-cortactin levels versus the yoked control at every time point, but this change was significant only at 4 hours. These findings are instrumental in illustrating the important events believed to facilitate dendritic spine growth, and thus, learning, following PAC.

## 9. Sulfa drug degradation by ferrate oxidation: Application of a green oxidizing agent in the removal of pharmaceuticals from the environment

Kyle Czech  
Faculty Mentor: Graeme Wyllie  
Department: Chemistry

Development of the latest generation of sulfa drugs has focused on improving both antibacterial properties and stability within the body. Increased stability, however, has resulted in detectable amounts of these drugs in the environment. Current water treatment techniques fail to remove these molecules, thus this project looks at utilizing a strong oxidizing agent as an alternative method. Traditional oxidizing agents such as hexavalent chromium can degrade pharmaceuticals but the resulting byproducts are extremely toxic. Ferrate is a superior alternative, exhibiting both great potential in breaking down pharmaceuticals and yielding non-toxic byproducts. Our work initially focused on developing a suitable procedure for creating ferrate within the laboratory and a reliable method to measure sulfa drug concentrations. The effectiveness of ferrate in treating a series of sulfa drugs was then investigated and significant decreases in sulfa drug concentrations were observed confirming the applicability of ferrate as a potential component of water treatment.

## 10. Investigation of music as enrichment promoting remyelination in the cuprizone mouse model: A pilot study

Steven Deline, Elizabeth Quincer, Nathalie Fida Lassang  
Faculty Mentor: Krystle Strand  
Department: Biology  
Program: Neuroscience

Multiple sclerosis (MS) is the most common demyelinating disease of the central nervous system. In addition to disruptions in sensory and motor systems, up to 70% of people with MS report changes in cognitive functioning, including depression and memory deficits. Healthy, wildtype mice fed the neurotoxicant Cuprizone experience marked CNS demyelination followed by partial remyelination. The aim of this study is to determine whether music provided as environmental enrichment during the 12-hour dark phase of the light/dark cycle affects behavior, ameliorates demyelination and/or promotes remyelination. We measured behavioral changes in Cuprizone-treated mice and evaluated the expression of genes involved in myelin synthesis. We hypothesize mice exposed to Cuprizone and music will exhibit differences in behavior, less severe demyelination and/or increased myelin synthesis during the remyelination period than mice exposed to Cuprizone without music. Analysis of behavioral data and myelin synthesis gene expression is ongoing.

## 11. Phenology of flowering rush and hardstem bulrush in the Detroit Lakes chain

Samantha Dusek, Emily Salo  
Faculty Mentor: Michelle Marko  
Department: Biology

Flowering rush, *Butomus umbellatus*, is an invasive plant that has been present in the Detroit Lakes system (Becker County, Minnesota) since the 1960's. Using four sites from across the lake chain, we measured the growth of flowering rush relative to that of native hardstem bulrush, *Schoenoplectus acutus*, using both destructive and non-destructive sampling techniques. Every three weeks from May through October, thirty samples were collected from each of the four sites using a six inch diameter corer. Flowering rush and hardstem bulrush emerged and senesced at nearly the same time of year. Rhizome bud production remained constant throughout the summer despite the slight decrease in below ground biomass observed; indicating the near-constant production of asexual reproductive parts even with decreasing plant biomass. This data combined with management studies will help identify the optimal treatment period for flowering rush that will cause minimal damage to the native vegetation.

## 12. Personal water purification techniques display variable efficacy at removing *Escherichia coli* from a contaminated water source

Fall 2010 Microbiology 407 Class  
Faculty Mentor: Ellen Aho  
Department: Biology

Safe drinking water is critical to global public health. Drinking water sources can be contaminated with many human pathogens, including bacteria, and the efficient removal of these pathogens is an important goal of both municipal and personal water purification systems. The fall semester Biology 407 class conducted a pilot study examining the ability of commercially available personal water purification methods to remove the indicator organism *Escherichia coli* from a contaminated water sample. Efficacy of removal was determined by spiking water samples with *E. coli* and then using the plate count method to measure the number of bacteria in pre- and post-treatment samples. Chemical methods, including iodine and chlorine, were the most effective in this study. A method utilizing UV light gave promising preliminary results in some trials. Filtration methods, including ceramic and glass filters, were the least effective at removing pathogenic bacteria from water.

## 13. On the existence of homo-halogen bonding in 2-Iodo-perfluoropropane

Scott Flancher, Mark Gealy, Darin Ulness  
Faculty Mentor: Darin Ulness  
Department: Chemistry

Recently, the covalent intermolecular interaction that has come to be known as the halogen bond has received a fair amount of attention in the literature. It has been seen to have a range of applications in many different areas including biochemistry, drug design, and material science. Up to this point the acceptors of the halogen bond have only been Lewis bases (namely, the lone pair on an oxygen or nitrogen atom). The current study intends to provide evidence for the existence of a homo-halogen bond interaction among the molecules of 2-iodo-perfluoropropane. This would be the first time that any atom other than oxygen or nitrogen has been seen to participate as a halogen-bond acceptor. The research conducted was made possible by grants from the NSF, Dreyfus Foundation, the Concordia College Research Endowment, and the Undergraduate Research, Scholarly and Creative Activities Grant Program.

#### 14. Soil respiration in autumn at different vegetation types

Sadie Fliegel, Katie Carstensen, Martha Branstiter, Sarah Vlasak  
Faculty Mentor: Laura Aldrich-Wolfe  
Department: Biology

Soil respiration is a key component to the global carbon cycle. We can use this information to track the occurrence of global climate change by observing how different land use types affect soil respiration. We researched soil respiration in three different sites at Concordia's Long Lake Field Station in Becker County, Minnesota: a recently harvested soybean field, a recently restored prairie, and a forested area. We used soda lime to capture carbon dioxide released by the soil for twenty-four hours. The amount of carbon dioxide was determined by comparing the mass of the soda lime before and after exposure. We found that there was no significant difference in soil respiration between the three sites, although variation within each site was high. Our sample size was very small which can be shown in our data. If more sampling occurred one site might show a higher soil respiration. In different land types, the emitted CO<sub>2</sub> can differ greatly between seasons. Soil respiration rates are dependent on temperature, precipitation, and vegetation. When looking at global climate change these factors must be taken into account.

#### 15. Illegal drugs in the prison system: Treatment options available to inmates

Ben Fraase  
Faculty Mentor: Laurie Dahley  
Department: Social Work

The number of inmates in American prisons has been skyrocketing in recent years. The American prison population has grown from 500,000 inmates to over 2,000,000 in the past 30 years. Researchers have found that 82% of state prison inmates are involved with drugs and/or alcohol while incarcerated and over half of the patients referred to public health treatment facilities were referred by the criminal justice system. The same researchers found that, though 82% of inmates were struggling with addiction problems, only 24% of inmates were actually receiving treatment for their drug addictions while in prison. Some prisons have begun to offer more and better treatment programs. But more treatment programs for the incarcerated are needed, because it has been found that treatment with continuing care and spiritual dimensions increases the chances of drug addiction recovery in inmates.

#### 16. *Neisseria lactamica* NL4 infections in C57J/B6 and 129X1/SvJ mice

Reba Greer, Naomi Holt, Michael Carlson  
Faculty Mentor: Krystle Strand  
Department: Biology  
Program: Neuroscience

*Neisseria meningitidis* is one common cause of bacterial meningitis, a serious disease characterized by inflammation of the meninges surrounding the brain and spinal cord that can be fatal or have serious sequelae. *N. meningitidis* colonizes the upper respiratory tract of 5-10% of adults and only occasionally leads to meningitis. A mouse model was used to determine the course of infection in the blood of *N. meningitidis* and the non-pathogenic species *N. lactamica*. We used two strains of mice that have been observed by other investigators to respond differently to *N. meningitidis* bacteremia. We measured global gene expression in the frontal cortex of the brain of both animal strains after infection with either *N. meningitidis* or *N. lactamica* to better understand the molecular mechanisms that may be important in the host response to *Neisseria* infection. We found differences in gene expression between the two animal strains in response to *Neisseria bacteremia*.

#### 17. Statistical properties of probability models for the Shannon Index

Reba Greer  
Faculty Mentor: John Reber  
Department: Mathematics and Computer Science

The Shannon (also known as Shannon-Weiner or Shannon-Weaver) Index is used in ecology to measure the biodiversity of a system. It describes both the number of species in a system as well as the evenness of species distribution within that system. Statistical properties of the Shannon Index will be explored including several probability models and methods for calculating uncertainty and confidence intervals. Properties of these models will be compared using Monte Carlo simulations.

#### 18. Product inhibition of NADP<sup>+</sup>-specific glutamate dehydrogenase by NADP<sup>+</sup>

John Head, Nathalie Fida Lassang  
Faculty Mentor: David Mork  
Department: Chemistry

*E. coli* glutamate dehydrogenase (GDH) is an enzyme that plays an intermediate role between nitrogen and energy metabolism. In nitrogen metabolism it combines  $\alpha$ -ketoglutarate and NH<sub>3</sub> into Glutamate according to the reaction  $\alpha$ -KG + NH<sub>3</sub> + NADPH → NADP<sup>+</sup> + Glu. The aim of the present study is to elucidate the enzyme kinetics of GDH. GDH was purified according to Lin and Reeves and we studied its kinetics by evaluating the effects of the inhibitor, NADP<sup>+</sup>, on varying concentrations of the substrate,  $\alpha$ -ketoglutarate. Analysis of initial velocity data for the reaction being studied is ongoing.

#### 19. Snail preference for native and invasive plant species

Kale Hermanson, Matt Krusen, Ryan Smith  
Faculty Mentor: Michelle Marko  
Department: Biology

The invasive species of Eurasian watermilfoil has been spreading rapidly throughout the lakes of Minnesota over the past 25 years. This plant species can be harmful to our lakes by outcompeting the native species resulting in reduced biodiversity and altered food webs. We performed no-choice and choice experiments to determine the preference and performance of a native snail, *Lymnaea sp.*, on Eurasian watermilfoil and native plant species. We measured the amount of the plant consumed and snail growth over a two-week period. Snail preferences varied by plant species. Snails preferred elodea and Richardson's pondweed to Eurasian watermilfoil, but preferred milfoil to Illinois pondweed. The snail may prefer the native plants when the invasive plant defenses are strong, but prefer the invasive when the native plant defenses are strong. Ultimately we hope to determine the ramifications of snail preference on watermilfoil, as it relates to the overall ecology of the lake.

#### 20. Containment strategies in network models

Lise Holte, Ryan Wagner  
Faculty Mentor: Dan Biebighauser  
Department: Mathematics and Computer Science

What is the best way to allocate resources in order to fight a forest fire? How should vaccines be distributed to limit the spread of a virus? Which areas need the most protection during a flood, and what is the most efficient way to distribute sandbags and other supplies to hold back the water? In situations like these, we are interested in defense strategies to contain the spread of something that is undesirable. In this project, we researched containment strategies in networks. A network is a collection of nodes and lines, where the lines represent relationships between the nodes. We improved existing network models and developed new models and containment techniques. In our poster presentation, we will highlight applications that are interesting and accessible for a wide audience, including an application where we studied the containment of the flooding of the Red River in Moorhead near the Concordia campus.

## 21. Analyzing the relationship between two invasive species at Long Lake Field Site

Corey Horien, Abby Sauer  
Faculty Mentor: D. Bryan Bishop  
Department: Biology

The "Invasive Meltdown Hypothesis" describes the manner through which two invasive species facilitate the growth of one another in a specific environment. This type of relationship has been observed between *Lumbricus terrestris* (European Earthworm) and *Rhamnus cathartica* (Common Buckthorn) in various temperate woodlands. Its existence in Northwestern Minnesota has never been explored, therefore this experiment was employed to examine whether the invasion of the Long Lake Field Site by Common Buckthorn has been accompanied by an increase in European Earthworm biomass. Plots were created in the woodlands at Long Lake and both Common Buckthorn stem density and European Earthworm biomass were calculated for each plot. Statistical analyses revealed that the given data indicated a significant relationship among the species analyzed.

## 22. Sandwich ELISA quantitative IL-4 analysis of serum samples from hookworm infected mice undergoing trial retinol treatments

Corey Horien  
Faculty Mentor: Jennifer Bath  
Department: Biology

Interleukin 4 (IL-4), a cytokine that induces differentiation of naïve T cells (Th0 cells) to Th2 cells, is an immune system protein associated with many human diseases. For example, altered IL-4 levels have been observed in patients with asthma and Alzheimer's disease, and interestingly, a vitamin-A deficient diet is also observed to change IL-4 levels. IL-4 is known to be one of the cytokines positively correlated to helminth protection in a host. Expanding on previous results, the goal is to use a quantitative sandwich Enzyme Linked Immunosorbent Assay (ELISA) to study IL-4 levels of mice infected with hookworm. In particular, we are looking for differences in IL-4 levels from different mouse groups (all infected) based on different dietary factors (low retinol, standard retinol, and high retinol diets). Resulting IL-4 levels can then be used to analyze potential correlations between retinol intake and the host's ability to clear a hookworm infection.

## 23. Construction of the Large-area multi-Institutional Scintillator Array (LISA) at Concordia College

Megan Jacobsen, Casey DeRoo  
Faculty Mentor: Bryan Luther  
Department: Physics

Efficient neutron detection is essential for experiments probing the structure of neutron-rich nuclei along the neutron dripline. Currently, the Modular Neutron Array (MoNA) detector operating at the National Superconducting Cyclotron Laboratory (NSCL) is capable of detecting high-energy neutrons (50-250 MeV) in radioactive isotope beam experiments with high efficiency. However, the efficiency of this detector is significantly reduced when more angular coverage is required for a particular reaction. An additional detector, the Large multi-Institutional Scintillator Array (LISA) was constructed during the summer of 2010. Using LISA and MoNA in conjunction allows the angular coverage or detection efficiency within a given experiment to be increased. Sixteen LISA detector bars were constructed and tested at Concordia College. By analyzing cosmic ray spectra and the gamma ray spectra of Bi-207, it was possible to gain-match the responses of the photomultiplier tubes (PMTs) and calculate the light attenuation length of each bar.

## 24. Product inhibition of NADP<sup>+</sup>-specific glutamate dehydrogenase by NH<sub>3</sub>

Sarah Johnson, Elizabeth Blair  
Faculty Mentor: David Mork  
Department: Chemistry

We are endeavoring to elucidate the kinetic mechanism of *E.coli* NADP<sup>+</sup>-specific Glutamate dehydrogenase in both the forward and reverse direction. This requires determining the pattern of inhibition for each of the ligands for this enzyme. Glutamate dehydrogenase was purified according to Lin and Reeves and the effects of glutamate, NADP<sup>+</sup>,  $\alpha$ -ketoglutarate, NH<sub>3</sub>, and NADPH on the kinetics were investigated. In investigating the kinetic mechanism of this enzyme we looked specifically at the product inhibition by NH<sub>3</sub><sup>+</sup> in the forward reaction. We have found NH<sub>3</sub><sup>+</sup> to be an inhibitor of glutamate dehydrogenase. The forward reaction proceeds as follows: NADP<sup>+</sup> + Glu  $\rightarrow$   $\alpha$ KG + NH<sub>3</sub><sup>+</sup> + NADPH.

## 25. Cognitive interruptions via text messaging: Measuring effects of multitasking on task performance in terms of speed and error

Kelsey Kava, Kristina Loken, Amanda Adair, Joel Tripp  
Faculty Mentor: Lisa Sethre-Hofstad, Stephanie Ahlfeldt  
Department: Psychology, CSTA

The mobile phone has brought about an era of constant connectivity by allowing users to virtually be connected wherever they go. Because so many people are attached to their mobile phones, our study set out to discover the effect that interruptions due to constant connectivity has on cognitive processes. Previous research suggests that secondary tasks negatively affect the result of primary tasks. In the present study, participants were divided into four different groups and given a cognitive test. Using text messages as interruptions, each group was interrupted throughout the test with varying levels of cognitive interruption for each group. The invasiveness of the textual interruption was measured by the students' errors, number of questions completed, and percent of completed questions correct. Analysis of the data showed that between the four groups, there were no differences in performance on the test. However, there were significant differences between groups on ratings of test difficulty and text message disruptiveness.

## 26. Just what the doctor ordered: Student stress and the order effect

Kelsey Keimig, Christopher Meller  
Faculty Mentor: Susan Cordes-Green  
Department: Psychology

A study of 172 undergraduate student participants was conducted to examine several aspects of student stress. First, the study evaluated a potential order effect that was hypothesized to have affected the results of prior studies. Second, the study examined the relationship between two different measures of stress (student versus event-related), as well as the relative ability of the two stress measures in predicting health symptoms. Results confirmed that the presentation order of scales measuring event-related stress and past event history affected stress scores. The results also showed that specific aspects of stress, such as intrusion and hyperarousal, best predicted pain and cold symptoms.

## 27. Observation of conflict interactions in friendships and romantic relationships

Sarah Kenz, Carol Tweten  
Faculty Mentor: Darcie Sell  
Department: Psychology

The key to a healthy relationship is a secret that is becoming ever clearer. Research indicates that the ratio of positive to negative interactions predicts relationship stability and satisfaction (Gottman, 1999). This study investigated the expression of affect during conflict in both romantic relationships and friendships. Relationships share similar patterns of a need for discussion and care for the other partner, but the increased connection associated with romantic relationships provides foundation for the hypothesis that these two relationships will experience conflict differently (Reis & Collins, 2004; Sanderson & Karetzky, 2002; Sanford, 2003; Sanford, 2011; Wied, Branje & Meeus, 2006). Couples engaged in videotaped conflict interactions specific to each relationship. Coding of the expression of affect during these discussions was performed by undergraduate psychology students (Waldinger et al., 2004). By assessing and understanding the affect present during conflict we are able better to educate on how to improve relationships.

## 28. Buckets of muckets in the benthos

Philip Knutson, Brad Peterson, Mary Gebhardt, Sarah Driscoll  
Faculty Mentor: Laura Aldrich-Wolfe  
Department: Biology

Mussels play an essential role in aquatic ecosystems by filtering microscopic organisms from the water column. Their ability to persist in lakes depends on the water quality and overall health of the lake. A healthy mussel population is a good indicator of how healthy a lake is. This research was conducted to determine if substrate or depth has a greater effect on mussel density. Mussel density was sampled at determined depths from four transects on the shore using 100 cm<sup>2</sup> quadrats at the Long Lake Field Station owned by Concordia College. At each sampling point, depth was measured and substrate was determined. Although there was a correlation between mussel density and depth, it was found that substrate was a better predictor of mussel density than depth. These results lead us to the conclusion that a silt/sand environment was the most suitable for mussels to thrive, and is a more important indicator than depth. We speculate that this is because of their feeding and burrowing habits.

## 29. Interpretation of meaning in text messaging: Effects of punctuation

Jamie Kubat, Katie Rotvold, Casey DeRoo, Michele Hockett  
Faculty Mentor: Lisa Sethre-Hofstad, Stephanie Ahlfeldt  
Department: Psychology, CSTA

Since computer-mediated communication does not have standard nonverbal cues available, certain elements of message interpretation may be lost (Walther, 1992). Past research has examined stylistic elements of computer-mediated communication but has not directly addressed text messaging nor has it examined specific examples of text-based social cues such as punctuation. The current study examined the effects of punctuation on impression formation in a text messaging medium of communication. This study was designed to test the relationship of five types of punctuation to eight dimensions of affective response. The results of this study showed that text message users made significant associations in their interpretation of a message between the types of punctuation used and the affective intentions of the sender. The results indicated that there was a trend for punctuation to be used as an alternate to nonverbal cues in a text-based form of communication.

## 30. Sculpture pad art collaborative experiment

Kyle Meerkins  
Faculty Mentor: Duane Mickelson  
Department: Art

When I learned that the Plains Art Museum began as a factory and showroom for the International Harvester Company, I was immediately struck by the potential to unite history and modernity around the theme of cultivation. Through conversations with Professor Duane Mickelson and various others, I began to engage the idea of cultivating the past and cultivating a future. As I dove deeper into this search, I wanted to unite the history of the museum and its current state to represent the cultivation that is happening in this space. Through the use of traditional forms of cultivator shoes juxtaposed with the current architecture of the building, I hope to find a unification of past and present while making a call to reconnect and reconsider the lives we lead. We have a long way to go to fully realize our potential, but sometimes we need to take steps back before we continue to leap forward.

## 31. Discovery of isotopes

Andrew Nystrom, Ashley Parker, Michael Thoennessen  
Mentor: Michael Thoennessen  
Department: Physics and Astronomy, Michigan State University

To date, no comprehensive study has been undertaken regarding the initial detection and identification of nuclear isotopes. A project has since been initiated at the NSCL to catalog and report the initial observations of every isotope. The conditions characterizing the successful discovery of an isotope include a clear and unambiguous mass and element identification through decay curves, mass spectroscopy, gamma-ray spectra, and/or relationships to other isotopes, as well as the publication of such findings in an adjudicated journal. During the summer of 2010, my partner and I completed the requisite research for nine elements not already addressed by the project. Here we present some of the results of the project as a whole, including trends involving the number of isotopes discovered per year, as well as the prevalence of certain methods locations with isotope discoveries over time. We will also discuss our contribution to the project.

## 32. Pattern avoidance in ternary trees

Katie Peske  
Faculty Mentor: Lara Pudwell  
Department: Mathematics and Computer Science, Valparaiso University

This project considers the enumeration of ternary trees (i.e. rooted trees in which each vertex has 0 or 3 children) avoiding a contiguous ternary tree pattern. We begin by finding the recurrence relations for several simple ternary trees; then, for more complex trees, we extend a known algorithm for finding the generating function that counts n-leaf binary trees avoiding a given pattern. After investigating bijections between these trees' avoidance sequences and other common combinatorial objects, we conclude by finding a bijective method to restructure specific tree patterns that give the same generating function, and generalizing this process to all ternary trees.

## 33. Living with Type 1 Diabetes

Allison Pieri  
Faculty Mentor: Laurie Dahley  
Department: Social Work

As the numbers show, diabetes is a very widespread and pervasive issue. It can affect people from all ethnic backgrounds, of all ages, and from both genders. 23.6 million people, or 7.8% of the U.S. population, is not a small group of people. They cannot be ignored if we hope to diminish the affects of this disease. For this reason I took a deeper look into Type 1 Diabetes. I looked at the issue from many angles including how the disease affects the body, what medical treatments are available, policies that are in affect to help alleviate some of the burdens that diabetes causes, and also interventions and approaches that social workers can utilize when working with diabetic clients.

### 34. Student development: Community-based learning or maturation effects

Marnie Rosenheim  
Faculty Mentor: Mona Ibrahim  
Department: Psychology

Community-based learning (CBL) integrates community service with classroom learning to help students develop personal and academic skills and civic responsibility. However, quantitative data on the benefits of CBL is lacking. Most studies assess only students engaged in the CBL experience, so it is unclear how well this pedagogy works. Survey data and open-ended reflections, regarding perceived benefits and challenges, were collected from students engaged in CBL as well as those not engaged in CBL at Concordia College. The questionnaire assessed student development across multiple domains including: academics, critical thinking/communication/inter-personal skills, local/global citizenship, and intra-personal development. Results showed significant differences in local/global citizenship, higher level of course satisfaction, and increased awareness towards stereotypes between those engaged in CBL and the control condition. Although a significant impact of academic growth for the control group was found, this may be due to the large proportion of upperclassmen in this condition.

### 35. Expression of *pilE1* and *pilE2* in *Neisseria* commensal strains *N. elongata*, *N. sicca*, and *N. subflava*

Angela Rossman, Joshua Watson, Steven Deline, Phillip Granley,  
Laura Brutscher  
Faculty Mentor: Krystle Strand  
Department: Biology

*Neisseria meningitidis* is a Gram negative, diplococcus bacterium and a common cause of meningitis in humans. The inflammation of the meninges can cause significant damage to brain tissue and be fatal in some cases. Serious sequelae occur in ~10-20% of those who recover. A primary virulence factor of *N. meningitidis* is the pilus fiber, a filamentous structure made of pilin subunits that is involved in twitching motility and adhesion of the bacteria to host cells. Using quantitative PCR, we measured the expression of two tandem pilin genes (*pilE1* and *pilE2*) in the non-pathogenic strains *N. sicca*, *N. subflava* and *N. elongata*. Expression of *pilE1* was more robust than *pilE2* in all strains, and the expression of *pilE1* and *pilE2* was higher in both *N. elongata* and *N. sicca* than in *N. subflava*. These data provide information on the composition of the pilus fiber in *Neisseria* strains with tandem *pilE* mRNA sequences.

### 36. Product Inhibition of the reaction $\alpha$ -ketoglutarate + $\text{NH}_4^+$ + NADPH + $\text{NADP}^+$ + glutamate by glutamate

Adam Sahlstrom, Drew Glogoza, Joe Marion  
Faculty Mentor: David Mork  
Department: Chemistry

We are investigating the product inhibition of *E.coli* NADP<sup>+</sup>-specific glutamate dehydrogenase to determine the enzymatic mechanism for this reaction in *E. coli*. This requires determining the pattern of inhibition for each of the ligands for this enzyme. We have duplicated purification of the enzyme according to Lin and Reeves and are investigating the effects of glutamate, NADP<sup>+</sup>,  $\alpha$ -ketoglutarate,  $\text{NH}_4^+$ , and NADPH on the kinetics of the reaction. The results of this particular study show the inhibitory effects of glutamate on glutamate dehydrogenase kinetics run in the  $\alpha$ -Ketoglutarate to glutamate direction.

### 37. Behavioral and gene expression analyses of lupus-prone MRL-*lpr*, wildtype and congenic control mice

Sadie Skarloken, Amber Ferris  
Faculty Mentor: Krystle Strand, Susan Larson  
Department: Biology, Psychology

Systemic lupus erythematosus (SLE) is a multifaceted autoimmune disease of unknown etiology that results in severe damage to joints, kidneys, heart, lungs and brain. As many as 70% of individuals with lupus exhibit changes in behavior or cognitive functioning. To better understand the effects of lupus, we analyzed behavior and cognitive functioning of 18- and 24-wk-old MRL-*lpr* lupus prone and

control mice, and measured gene expression in the hippocampus. Lupus-prone animals exhibited differences in behavior on anxiety-related tasks congruent with elevated levels of anxiety, on passive avoidance learning at 18 weeks and spatial learning at 24 weeks. Microarray analysis of hippocampal RNA revealed differences in expression of genes involved in biological processes including ubiquitination, protein folding, and apoptosis regulation. We are currently evaluating behavior and cognitive functioning at earlier time points and measuring gene expression in amygdala, kidney, and hippocampus at these and later stages of disease.

### 38. Examining the effectiveness of the milfoil weevil as biocontrol for Eurasian water milfoil in the Lake Pend Oreille system

Lydia Stinar, Blake MacKenzie  
Faculty Mentor: Michelle Marko  
Department: Biology

Eurasian water milfoil (*Myriophyllum spicatum*), an aggressive invasive aquatic plant, is now in 46 states and over 200 waterbodies in Minnesota. Milfoil outcompetes native vegetation, forming dense mats at the water surface that block sunlight, lower lake oxygen levels, degrade water quality, and hinder recreation. One method of control is using the native weevil, *Euhrychiopsis lecontei*, as a biocontrol agent. EnviroScience Inc. collects, breeds, sells and stocks the milfoil weevil to control milfoil populations. We examined the presence of the weevil at five sites on the Pend Oreille system before and after stocking by EnviroScience Inc. The data show that weevils survive stocking and are present in Lake Pend Orielle one month after inoculation, but have little impact on milfoil populations. Further research is necessary to determine whether populations can build-up to densities great enough to control Eurasian water milfoil populations.

### 39. Protective power of the strawberry

Kayla Thorson  
Faculty Mentor: Ellen Lutgen  
Department: Dietetics

The strawberry, a member of the rose family, contains nearly 200 seeds and is the only fruit to wear its seeds on the outside of its flesh. Strawberries provide an excellent source of fiber, potassium, vitamin C, folate, and phytonutrients. Research has shown consumption of strawberries to be a significant source of antioxidants with potential health benefits. Antioxidants may help reduce inflammation and oxidative stress caused by free radicals in the body. In addition, researchers suggest the high antioxidant activity of strawberries being associated with reducing the risk of cardiovascular disease, stroke, diabetes, certain cancers, and neurological decline. Furthermore, strawberries improved the taste and palatability of the cholesterol-lowering diet, making it easier to follow over the long-term. Results from recent scientific studies provide positive evidence of the important role that strawberry consumption plays in cardiovascular health.

### 40. Observed changes in Cortactin and Src concentrations over time following learning and memory formation

Joshua Watson, Briana Conrad  
Faculty Mentor: Mikel Olson  
Department: Psychology

In our research we studied two proteins, Cortactin and Src, which are found in the dendritic spines of neurons and involved in synaptic restructuring by assembly of new actin chains during memory formation. Rats were trained over the course of 16-20 days in the radial arm maze (RAM), which consisted of a training and testing trial five minutes apart. After learning how to navigate the RAM correctly, rats were randomly divided into 5 different groups so that we could look at the time course of protein expression following memory formation. In a second experiment we tested whether bilateral intracranial injections of MK-801, an NMDA receptor antagonist, affected protein expression. Our results suggest that protein concentrations are affected by learning and change during memory formation. These findings are important because dendritic anomalies and memory impairments are seen in many neurological disorders.