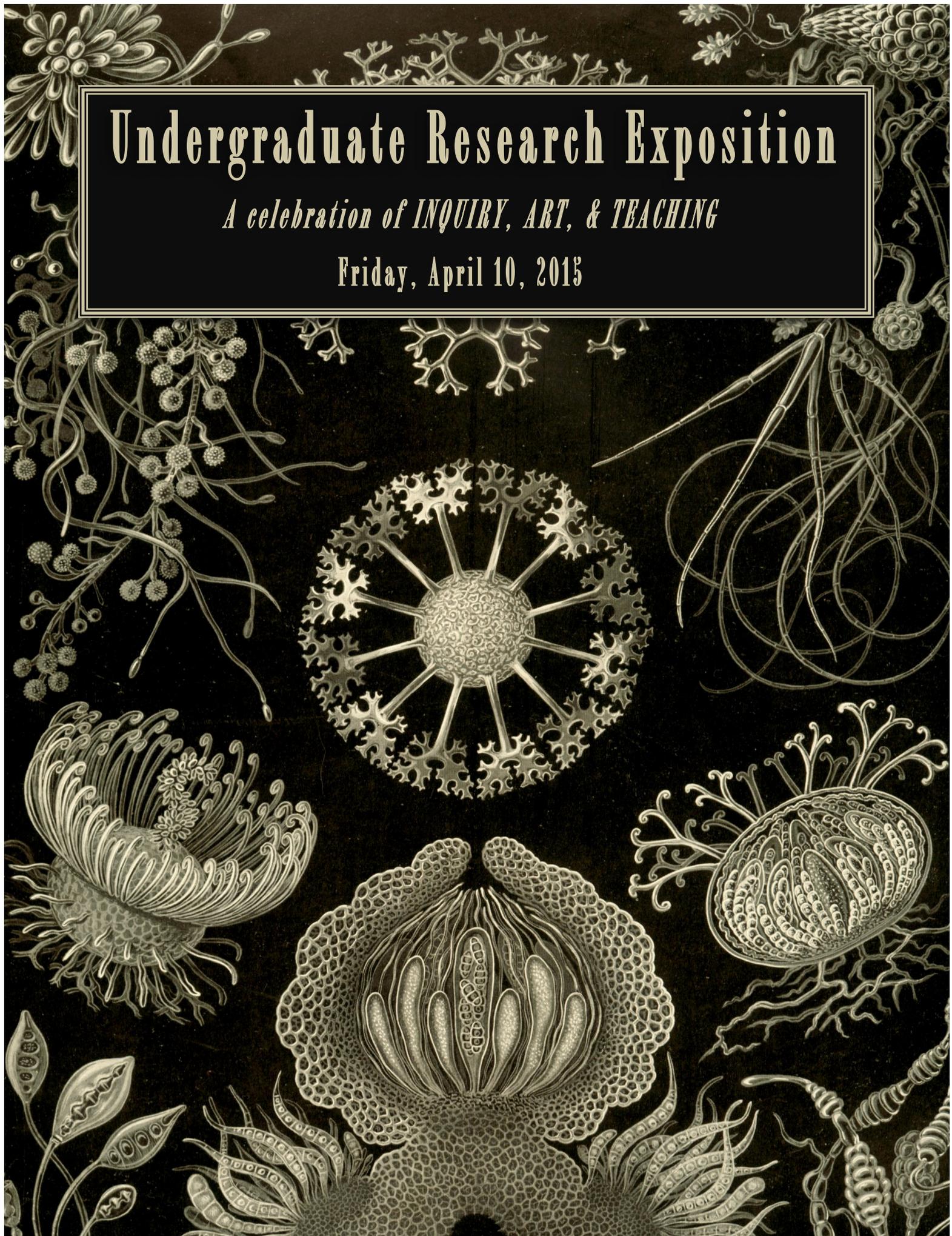


Undergraduate Research Exposition

A celebration of INQUIRY, ART, & TEACHING

Friday, April 10, 2015



Order of Events

12:30 p.m.

SYMPOSIUM TALKS

*Engineering & Applied Sciences
Computer Science Building 209*

*Natural Sciences & Mathematics
Dewey 2-110E*

Humanities

Welles-Brown Room, Rush Rhees Library

Social Sciences

Morey 321

2:00 p.m.

POSTER SESSION

Hawkins-Carlson Room

Rush Rhees Library

3:15 p.m.

UNDERGRADUATE RESEARCH AWARDS

VISUAL ART IN UNDERGRADUATE RESEARCH AWARDS

SA PROFESSOR OF THE YEAR AWARDS

Hawkins-Carlson Room

Rush Rhees Library

3:55 p.m.

CLOSING REMARKS

Hawkins-Carlson Room

Rush Rhees Library

***Engineering and Applied Sciences
Computer Science Building 209***

12:30 p.m.

***Madeleine Laitz '16
Chemical Engineering
Mentor: Dr. John Essigmann***

"Lethal Mutagenesis: Curing AIDS"

12:50 p.m.

***Marlen Mahendraratnam '16 & Allison Stiller '16
Biomedical Engineering (both)
Mentor: Professor Stephen Burns***

***"Experimental Analysis of Superlooping in Polymer Line and its
Applications to Mathematical Models of DNA"***

1:10 p.m.

***Jeremy Warner '15
Electrical and Computer Engineering
Mentor: Professor Philip Guo***

"A Large-Scale Study Of Interactive Digital Textbook Usage"

*Abstracts available in final pages

*Natural Sciences and Mathematics
Dewey 2-110E*

12:30 p.m.

*Md Tanveer Karim '16 (Take Five '17)
Physics and Astronomy
Mentor: Professor Eric Mamajek*

*“A Modern Estimate of the North Galactic Pole and a Proposed
Revision to the Galactic Coordinate System”*

12:50 p.m.

*Thomas Rzatkiewicz '16
Biology
Mentor: Professor Daven Presgraves*

*“Fine Scale Mapping of Hybrid Male Sterility on the Drosophila X
Chromosome”*

1:10 p.m.

*Courtney Wagner '15
Geobiology
Mentor: Professor John Tarduno*

*“Characterization of a Single Magnetotactic Bacterial Species from
Devil's Bathtub, Mendon Ponds Park, Honeoye Falls, NY ”*

*Abstracts available in final pages

Humanities
Welles-Brown Room, Rush Rhees Library

12:30 p.m.

Kristina Fricker '15
History / Archaeology, Technology, and Historical Structures
Mentor: Professor Elizabeth Colantoni

“Ptolemaic Shipbuilding: A Case Study of the Evolution of the Athenian Trireme”

12:50 p.m.

Kelly Guerrieri '14 (Take Five '15)
Archaeology, Technology, and Historical Structures
Mentor: Professor Curt Cadorette

“Chained Freedom: Augustine, Luther, and Calvin on the Free Will Debate”

1:10 p.m.

Gala Tubera '15
History
Mentor: Professor Missy Pfohl Smith

“The Tune of Attempt: Balancing Depression and the Idea of Normalcy”

*Abstracts available in final pages

*Social Sciences
Morey 321*

12:30 p.m.

*Alyssa Arre '15 (Take Five '16)
Ecology and Evolutionary Biology / English
Mentors: Dr. Alexandra Rosati & Professor Jessica Cantlon*

“Developmental Changes In Primate Gaze Following”

12:45 p.m.

*Collin Bowen '16
History
Mentor: Professor Michael Jarvis*

“Atlantic Transit Times”

1:00 p.m.

*Emily Sumner '15
Brain & Cognitive Sciences
Mentor: Professor Celeste Kidd*

*“Toddlers Always Get the Last Word: Recency Biases in Early Verbal
Behavior”*

1:15 p.m.

*John Wilson '15
Molecular Genetics / Psychology
Mentor: Professor Diane Morse*

*“Primary Health Clinics For Formerly Incarcerated Women: Are
They Linking Patients To Care?”*

**Abstracts available in final pages*

Poster Exhibition Participants

ENGINEERING & APPLIED SCIENCES

Erin Antonienko '17

Biomedical Engineering

“Development of Temporally Controlled Release Systems for Pro-Angiogenic Peptides”

Timothy Felong '15

Biomedical Engineering

“Tissue Engineering Approaches for the Salivary Gland”

Jeremy Hassett '16

Audio & Music Engineering

“Practical Implementation of an Efficient Grating-Analysis Method”

Steven Tau '16

Chemical Engineering

“Targeted Polymeric Micelles for Leukemia Therapeutics”

NATURAL SCIENCES & MATHEMATICS

Paul Angland '15

Physics

“Using Simulated Annealing Techniques to Determine the Plasma Density Profiles from Angular Filter Refractometry Data”

Elizabeth Brown '15

Cell & Developmental Biology

“Validation of Gold Nanoparticle Deposition in a Novel Air Liquid Interface System”

John Decourcey '15

Chemistry

“Ribosomal Synthesis of Macrocyclic Peptides”

Jenna Kaempfer '15
Geological Sciences

“Generations of Deformation Within Santaquin Complex of Santaquin,
Utah”

Morgan Kath '16
Biochemistry

“Analysis of the Specificity of Influenza Specific CD4 T Cells”

Jamie Strampe '15
Microbiology

“The Density and Orientation Of HIV-1 Env on a Nanoparticle Vehicle
Influences the Magnitude and Quality of the Env-Specific Response
Elicited Following Immunization in Mice”

Eugenia Zeng '17
Cell & Development Biology

“Investigating the Effect of the Stress Neurohormone Norepinephrine on
Breast Cancer Exosomes”

SOCIAL SCIENCES

John Bernstein '15
Psychology / Brain & Cognitive Sciences

“The King-Devick Test as a Predictor Of Cognitive Effects After
Chronic Partial Sleep Restriction”

Kaiyuan Chen '15
Psychology

“Internalization of Personality as Obligation: Examining the Congruence
Between Implicit Actual Self and Explicit Ought”

Yinghui Qiu '15
Brain & Cognitive Sciences

“Evidence of Recursive Thinking in Monkeys”

Rachael Roddenbery '15
Psychology / Bioethics

“The Association of Parental Attributions of Children’s Misbehavior and the Use of Antecedent-Based Parenting Strategies for Caregivers of Children”

Natalie Santacesaria ’16
Psychology

“Distinguishing Motivating and Demotivating Experiences at Work: A Self Determination Theory Approach”

Kathryn Strelevitz ’16
International Relations / Earth & Environmental Science
“United States Participation In Multilateral Treaties: Nuclear Success Versus Environmental Non-Committance”

Julia Yurkovic ’15
Psychology / Brain & Cognitive Sciences
“Correlations Between Numerical Cognition and Working Memory”

HUMANITIES

Nicole Zizzi ’14 / T515
Physics
“Improvising Architecture: A Research in Spatial Relations of Structure and Movement”

Visual Art in Undergraduate Research

Jonathan Boualavong '16 (Take Five '17)

Biomedical Engineering

“Fluorescence”

Yanyi Jiang '15

Studio Arts

“Sunny’s Tarot Cards”

Md Tanveer Karim '16

Physics & Astronomy

“ V1647 Ori (Mcneil's Nebula)”

Morgan Kath '16

Biochemistry

“EliSpot”

Molly Nemer '16

Film & Media Studies / Digital Media Studies

“Aino”

Pedro Pinera '16

Studio Arts / Art History

“Week Plan”

Anna Saltman '15

Biology / Studio Arts

“Under the Skin: Multiple Sclerosis”

Gala Tubera '15

History

“The Black Room”

Nicole Zizzi '14 (Take Five '15)

Physics

“A Research in Spatial Relations of Structure and Movement”

Student Association Professors Of The Year

Humanities:

***Professor Nicholas Gresens
Department of Religion & Classics***

Engineering:

***Professor Christopher Muir
Department of Mechanical Engineering***

Natural Sciences:

***Professor Alex Iosevich
Department of Mathematics***

Social Sciences:

***Professor Theodore Brown
Department of History***

Undergraduate Research Awards

3:17 p.m.

***PROFESSOR STEVEN MANLY
Introductory Remarks***

3:20 p.m.

***VICE PRESIDENT & DEAN PAUL BURGETT
Presentation of the President's Awards for Undergraduate Research***

3:28 p.m.

***VICE PRESIDENT & DEAN PAUL BURGETT
Presentation of the Deans' Awards for Undergraduate Research in
Engineering & Applied Sciences, Humanities, Social Sciences,
Natural Sciences & Mathematics***

3:35 p.m.

***PROFESSOR STEVEN MANLY
Presentation of the Professors' Choice Awards for
Undergraduate Research
Presentation of the Awards for
Visual Art in Undergraduate Research***

3:40 p.m.

Students' Association Professor of the Year Awards

3:55 p.m.

***PROFESSOR STEVEN MANLY
Closing Remarks***

ABSTRACTS

Alyssa Arre '15 (Take Five '16)

“Developmental Changes In Primate Gaze-Following”

Gaze following, or the ability to co-orient with others, is an essential skill for human social behavior because it allows for people to gain perspective on how others view the world. Few studies have examined developmental patterns of gaze following in nonhuman primate species and to date, the literature concerning the underlying mechanisms is relatively inconclusive. Here, we tested a large sample (n=459) of free-ranging rhesus macaques at the Cayo Santiago field site in Puerto Rico with the intent to better understand the developmental patterns of the gaze-following ability in nonhuman primates. In our study, we presented macaques with an experimenter that gazed in a pre-specified direction to look for patterns in this ability in macaques varying in age. Our results show that the developmental pattern of gaze following in the rhesus macaque parallels that in humans, with early emergence in infancy and a decline of proficiency into old age. Understanding how complex cognitive abilities such as gaze following develop in nonhuman primates can help us gain a better picture of human uniqueness and the evolution of these capabilities over time.

Collin Bowen '16

“Atlantic Transit Times”

According to the most authoritative voices in trans-Atlantic maritime history, shipping speeds from Europe to the colonies in the Caribbean and North America did not improve in the 18th century. However, the motivations to improve technology and sailing strategies to decrease time spent at the sea are boundless. Using the American Historical Newspapers database, a more complete look at shipping times in the era can definitively answer an old question using this new technology. The data collected resulted in the ports of Boston, New York, and Philadelphia being the central data points for comparing travel speeds. When analyzed, the data suggests that if shipping times did improve, then they did so marginally. This begs the question that if the times

improved but not by a large percentage, what held back this progression that would seem almost inevitable?

Kristina Fricker '15

“Ptolemaic Shipbuilding: A Case Study of the Evolution of the Athenian Trireme”

Athenians dominated naval warfare and transport in the Mediterranean Sea for much of the Classical period (5th-4th c. BCE). Ultimately, the various cultures that relied on the sea and actively participated in naval warfare began to alter and adapt designs like the Athenian trireme in order to make the ships more efficient. During the Hellenistic period (3rd-1st c. BCE), warships underwent massive changes and innovations to make the ships larger, faster, and stronger. The purpose of this presentation is to examine the evolution of the Athenian trireme during the Hellenistic period using ships created during the Ptolemaic dynasty as a case study. Ultimately, this analysis will be used to argue that current views on the cause of the “Big Ship Phenomena” are too narrow and the advancements during the Hellenistic period were the result of an arms race between contenders for the empire left behind by Alexander the Great.

Kelly Guerrieri '14 (Take Five '15)

“Chained Freedom: Augustine, Luther, and Calvin on the Free Will Debate”

For centuries, the debate between free will and determinism has challenged people across disciplines. During the Protestant Reformation period, a time of great philosophical, theological, and cultural debate and change, divergent positions regarding human free will arose. Martin Luther, the primary leader of the first wave of the Reformation, developed in his theology a particular view of free will that is highly nuanced and therefore difficult to categorize. A few decades later, John Calvin turned again to the question of human free will, formulating his own doctrine against that of Luther. Both reformers, however, drew from St. Augustine of Hippo as their source, a father of the Roman Catholic Church from which they were separating, and both developed forms of hard theological determinism. However, based on their interpretations of Augustine and the Bible, Luther and Calvin developed

detailed theories of predestination and free will that differ significantly but subtly from each other, and their individual interpretations have often been confused with each other's, even among their followers. This project examines the writings of Augustine, Luther, and Calvin in order to trace the influence of Augustine, and his influence St. Paul, upon the Reformers and to differentiate Luther and Calvin's positions on free will from each other.

Md Tanveer Karim '16 (Take Five '17)
***“A Modern Estimate of the North Galactic Pole and a Proposed
Revision to the Galactic Coordinate System”***

Astronomers are entering an era where they will have ~ 0.01 -milliarcseconds precision astrometry for the brightest $\sim 10^9$ stars via the Gaia mission, but are converting equatorial positions and velocities to a five decade old Galactic coordinate system only defined to $\sim 0^\circ.1$ accuracy. Recent studies show that the 1958 International Astronomical Union (IAU) definition of the origin of the Galactic coordinate system misses the dynamical center of the Galaxy (Sgr A*) by $\sim 0^\circ.07$. We utilize recent catalogs of Galactic disk tracer objects such as HII regions, embedded and open clusters, infrared bubbles and dark clouds, etc. to independently calculate new estimates of the fundamental parameters defining the Galactic coordinate system: right ascension (α_{NGP}) and the declination (δ_{NGP}) of the North Galactic Pole (NGP) and the position angle of the Galactic center at the NGP with respect to the North Celestial Pole (θ). Using the available catalogs, we provide two new estimates of the NGP: (#1) a “best” NGP determined by the Galactic tracer sources - unconstrained by consideration of the position of Sgr A* (and which happens to lie $90^\circ.119$ from Sgr A*), and (#2) a “forced” NGP which lies exactly 90° from Sgr A*, along the great circle connecting Sgr A* with the first “best” pole. The “best” NGP (solution #1) has International Celestial Reference System position: $\alpha_{\text{NGP}} = 192^\circ.780 \pm 0^\circ.015$, $\delta_{\text{NGP}} = 27^\circ.152 \pm 0^\circ.007$ and $\theta = 122^\circ.951 \pm 0^\circ.007$. The best “forced” NGP (solution #2) which lies exactly 90° away from Sgr A* has ICRS positions: $\alpha_{\text{NGP}} = 192^\circ.891$, $\delta_{\text{NGP}} = 27^\circ.087$ and $\theta = 123^\circ.002$. The difference between the solutions is likely a natural result of the Sun lying ~ 20 parsec above the Galactic Plane and Sgr A* lying a finite distance (~ 8 kiloparsec) away.

Madeleine Laitz '16
"Lethal Mutagenesis: Curing AIDS"

There is presently no cure for the AIDS virus, due to its high rate of mutation. It is impossible to eradicate a rapidly evolving virus with a standard medication regimen, which has thus far been the only method employed. Dr. John Essigmann's Biological Engineering team at MIT has turned the virus's mutagenic defense mechanism into its undoing. Tautomerism is the basis of this idea: when treated with a mutagenic compound, the rate of mutation of the AIDS virus increases beyond the point of viability, so that its progeny are no longer harmful. This property is exhibited by 5-aza-5,6-dihydro-2'-deoxycytidine, or KP1212, which exists as five structural isomers. It was found that one in every ten KP1212 molecules in the HIV genome will precipitate a new mutation, due to its proclivity to pair with both guanine and adenine. To better understand the potential of lethal mutagenesis as a cure for AIDS, a novel compound never before synthesized was required, as its similar mutagenic properties and simplified structure would allow for ¹H and ¹³NMR spectroscopy analysis critical to determining the behavior of existing molecular candidates like 5-hydroxydeoxycytidine. This new compound, 5-methoxydeoxycytidine, was successfully synthesized and will shed light onto the mechanism of a potential cure for AIDS.

Marlen Mahendraratnam '16 & Allison Stiller '16
"Experimental Analysis of Superlooping in Polymer Line and its Applications to Mathematical Models of DNA"

It is well known that DNA has a double helix structure due to chemical interactions between its base paired molecules. These interactions with mechanical forces cause DNA to bend and twist, which controls gene expression and other processes such as transcription and translation. Current mathematical models and torsional tests on DNA have proven that at certain critical forces during twisting, DNA forms superloops due to instability of the structure; however, there is little experimental research to explain the geometry of this process. A superloop is defined in this paper as a loop created as a mechanism to release torsional stress. In our research, we used an isotropic polymer line that would exhibit superlooping when placed under torsional stress. First, experiments were

done to find mechanical properties of the line such as the elastic modulus and torsional modulus of elasticity. Knowing these values, we were able to determine the critical force and torque of buckling for the line which indicate the conditions needed to induce instability and therefore superlooping in the material. Finally, a variety of rotational tests were performed to observe the superloop formation pattern of the line. Several different methods were used including rotating load cells in tensile machines. Geometric relationships defining superloop formation were determined using the connection between number of twists, nature of the twists, and applied force and then were compared to current theoretical mathematical models. We found that the number of superloops created is proportional to the number of turns on the polymer line. Calculations of this relationship were made with respect to many different applied loadings. Our calculations verified Bernard Coleman's theories on Kirchhoff's laws and its applications to superlooping as a guide; however, they require some modification to adequately describe superlooping.

Thomas Rzatkiwicz '16

“Fine Scale Mapping of Hybrid Male Sterility on the Drosophila X Chromosome”

Since Darwin's seminal book *The Origin of Species* scientists have studied how new species form, yet many underlying questions about the process speciation exist. Genetic analysis across taxa (mammals, bird, insect) suggests the X chromosome contributes a disproportionate amount to the process of speciation (known as the large X effect). To identify and characterize an X-linked hybrid sterility gene we introgressed a 3Mb region of the *Drosophila mauritiana* X chromosome into *D. sechellia*, and then generated recombinant lines within this region. Genetically identical recombinant sons were tested for sterility and genotyped to identify the smallest HMS region(s). The phenotype and genotype data reveal at least two HMS-causing regions. We have narrowed down one HMS region to 40 kb, containing six candidate HMS genes. Further plans include transgenically validating and characterizing the evolutionary history of the HMS gene. This study has important implications for understanding the genetic basis of Haldane's rule and the large X effect.

Emily Sumner '15
"Toddlers Always Get the Last Word: Recency Biases in Early Verbal Behavior"

A popular conception about language development is that comprehension precedes production. Although this is certainly true during the earliest stages of phonological development, once a child possesses the basic articulatory skills required for imitation, it need not necessarily be the case. That is, a child could produce a word without possessing fully formed lexical representations simply through imitation. In some cases, such as in response to questions containing fixed choices, this behavior could be mistaken for a deeper understanding of the words' semantic content. In this paper, we present evidence that 2-to 3-year-old children exhibit a robust recency bias when verbally responding to two-alternative choice questions (i.e., they select the second, most recently mentioned option). Further, we present evidence that this bias does not exist for manual responses, suggesting that the underlying cause may be due to the availability of the word form in phonological memory. We find further evidence of this effect outside of a laboratory setting in more naturalistic conversational contexts in CHILDES (MacWhinney, 2000), a large corpus of transcribed child-adult interactions.

Gala Tubera '15
"The Tune of Attempt: Balancing Depression and the Idea of Normalcy"

Depression and anxiety are mental conditions that affect a large population at the University of Rochester. For those suffering from mental illness, dance can be an outlet in which to express their struggle. In *The Tune of Attempt*, depression and anxiety is explored through movement. The result is a short film and a staged piece that captures the reality of mental illness, thus opening the conversation for further understanding. It is the habit of society to veer away from discussing the subject of mental illness outside of the scientific realm. Due to stigma, mental illness is often pushed away or hidden from public view, only to be discussed with a doctor. However, for those living with mental illness, it is not a subject that can easily be ignored. Through artistic expression, my research aims to shed light on the two faces of those who

have depression and severe anxiety. There is the face presented to the public. It is the high functioning face of normalcy. On the other side, there is the face of the person at home, wherever that may be, where the illness reigns. The reality of living with mental illness is the constant flux between these two stages. On a good day, the world gets to see the first face; on others, the latter emerges. My choreographic research focuses specifically on this dichotomy in the hopes that others are able to view the piece and understand those going through this struggle. The end result will be a short dance film. I have created a teaser trailer for the final film, due to be complete by the first of April. It is linked at the bottom of this document. The teaser specifically highlights the film's use of modern dance to convey the constant ebb and flow of those attempting to function in day-to-day life while battling depression and anxiety. The use of film to document the choreographic research, versus other mediums such as live performance, is to allow for multiple presentation opportunities. However, in addition to the short film, this research will also be adapted into a stage piece to be performed in late April.

Courtney Wagner '15

“Characterization of a Single Magnetotactic Bacterial Species from Devil's Bathtub, Mendon Ponds Park, Honeoye Falls, NY ”

Magnetotactic bacteria (MTB) belong to a lineage of prokaryotic bacteria that synthesize magnetosomes. Magnetosomes are single domain magnetic particles (magnetite or greigite), which average 50 nm in size. MTB utilize magnetosomes through magnetotaxis, the alignment and movement along magnetic field lines to navigate towards preferred environmental conditions. Devils Bathtub (Mendon Ponds Park, Honeoye Falls, NY,) is a meromictic glacial kettle pond surrounded by deciduous tree cover. Here we examine one species of MTB based off of prominence of this particular morphology compared to other MTB morphologies at this locale. Magnetotaxis and morphology of this MTB have been observed under light microscope and potential micrographs have been taken using Scanning Electron Microscopy (SEM). The magnetosome chains have yet to be imaged in situ for this particular species. Transmission Electron Microscopy (TEM) and magnetic hysteresis measurements were done to test the composition of the magnetosomes. In this study we also focus on the DNA sequencing and

characterization of this MTB. There are few MTB species which have been DNA sequenced successfully. Key experiments performed during this process included purification and amplification of 16S rRNA genes (using the forward and reverse primers Bact 8 and Bact 338, respectively), DNA sequencing via GeneWiz, sequencing analysis using 4peaks software, and National Center for Biotechnology Information (NCBI) Basic Local Alignment Search Tool (BLAST) to compare sequencing results to other known bacterial species through alignment and DNA similarity grouping. Here we provide preliminary data suggesting that this MTB has diplococcus cell morphology and synthesizes magnetite magnetosomes. These magnetosomes are mostly hexagonal-like in morphology and average 50 nm in diameter. This would, ultimately, place these magnetosomes in the single domain (SD) particle range. Although these data are preliminary, evidence points towards the discovery of a new bacterial species.

Jeremy Warner '15

“A Large-Scale Study Of Interactive Digital Textbook Usage”

Digital textbooks are now growing popular as a lower-cost and more interactive alternative to paper textbooks. Despite the recent rise in adoption, little is known about how students actually use these resources. Prior studies have investigated student perceptions of digital textbooks in the classroom via questionnaires but have not analyzed actual usage patterns. We present, to our knowledge, the first large-scale quantitative study of digital textbook usage. We mined 6.8 million log events from over 43,000 students interacting with How To Think Like a Computer Scientist, one of the most widely used Web-based textbooks for learning computer programming. We compared usage patterns among three user populations: high school students, college students, and online website viewers. We discovered that students made extensive use of interactive components such as executing code and answering multiple-choice questions, engaged for longer periods of time when taking high school or college courses, and frequently viewed textbook sections out of order. These findings inspired a set of design ideas for how the next generation of digital textbooks could leverage real-time usage data to assist students, instructors, and textbook authors.

John Wilson '15

“Primary Health Clinics For Formerly Incarcerated Women: Are They Linking Patients To Care?”

Individuals recently released from incarceration face challenges while accessing primary medical care, mental health care, addiction treatment, and medication as they transition back into their communities. Furthermore, women are the fastest growing members of the incarcerated population and have additional health risks, including histories of trauma, high-risk sexual behaviors, and increased risk of contracting HIV and Hepatitis C. While primary care clinics have been established for patients with substance abuse, few clinics have been initiated for recently released individuals. We examined the effects of a transitions primary care clinic for recently released women housed in a Department of Psychiatry at an academic medical center. Of the 198 women recruited between September 2012 and August 2014, 98 (49%) attended the clinic for an average of four visits and completed the intake process. Women who attended the clinic did not significantly differ from those who did not attend on age or ethnicity but did differ on race. Prevalence of Hepatitis C and HIV among patients was 10% and 1%, respectively. A preliminary analysis of patients demonstrated that the majority of patients who were referred to testing completed the testing. Additional results pertaining to chronic health problems, substance use history, and ED, inpatient, and outpatient visit statistics for the entire clinic sample are forthcoming. Women recently released from incarceration were successfully linked to primary care and assessments in a medical transitions clinic housed in a Department of Psychiatry. Clinics for justice-involved women using gender, trauma, motivational, and culturally informed strategies may serve to improve these vulnerable patients' myriad chronic health problems. Moreover, efforts to engage those who did not attend the clinic and declined testing are worthy of further explanation. Additional implications will be discussed.

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