SYMPOSIUM
Undergraduate Research 2015

Every horizon, upon being reached, reveals another beckoning in the distance. Always I am on the threshold. - W. Eugene Smith

Monday
April 20
9:00-10:30am
1:00-2:30pm
La Maison Salon & Hall

Tuesday
April 21
9:00-10:30am
1:00-2:30pm
La Maison Salon & Hall
2:30-4:00pm
Testa Fuller Aud
2:00-4:00pm
Testa Atrium

For more information
Please visit the Assumption Portal
Welcome to the 21st Annual Undergraduate Symposium, highlighting the research and scholarly achievements of Assumption students working in collaboration with dedicated faculty mentors. These collaborations represent a model for integrating teaching, original research, and the beneficial effects of peer review in promoting intellectual development and professional growth. The Symposium provides the campus community the opportunity to gain a greater appreciation of the individual and collective accomplishments of our faculty and students, as well as to applaud those achievements.

I hope that you enjoy and profit from viewing the posters, hearing the papers, and speaking with the authors of these impressive works.

Sincerely,

Louise Carroll Keeley
Interim Provost and Academic Vice President
## Undergraduate Symposium

### Program Schedule

**Monday, April 20, 2015**

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<td>9-10:30 a.m.</td>
<td>Presentation Session 1A</td>
<td>La Maison Salon</td>
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<td>Presentation Session 1B</td>
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<tr>
<td>1-2:30 p.m.</td>
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<td>Presentation Session 5</td>
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<td>2-4 p.m.</td>
<td>Poster Session</td>
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<td>Brianna Abbott ’15</td>
<td><em>Angels in Training: A Feminist Analysis of the Heroines and Mentors of Newbery Gold</em></td>
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<td><em>Breaking Lolita - The Novel, the Films, and the Myth</em></td>
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<td><em>Drihten and Pegn</em></td>
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<td>Sara Heath ’15</td>
<td><em>The Implicit Imperialists: The Disnification of American Hegemony in the Middle East 1990-1991</em></td>
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<td>Andrea Kolodziej ’15</td>
<td><em>A Creative Screenplay - The Apple Tree</em></td>
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<tr>
<td>9:00</td>
<td>Carrie Abreu ’16</td>
<td><em>Man’s Best Friend: Variations in Emotions, Emotion Regulation, and Affinity for Dogs</em></td>
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<td>Emily Sansivero ’15</td>
<td><em>The Power of Play: Characteristics of Video Game Players and the Effects of Gameplay on Flow</em></td>
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<td>Katherine Schmidt ’15</td>
<td><em>Perception of Movement Synchronization Differences in Autism Spectrum Disorder</em></td>
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<tr>
<td>9:45</td>
<td>Andrea Garry ’15</td>
<td><em>Comorbidity of ADHD and Anxiety Disorders in Children and Adolescents</em></td>
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<tr>
<td>1:00</td>
<td>Rebecca Corridori ’15</td>
<td>A Comparative Study of Brain-Computer Control of Robotic Devices vs. Brain-Nerve Driven Control of Artificial Limbs</td>
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<td>1:15</td>
<td>Joseph Douglass ’15</td>
<td>Evaluation of the i-STAT Hematocrit and Hemoglobin Tests</td>
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<td>1:30</td>
<td>Abigail Heroth ’15</td>
<td>Thyroid Hormone Regulation of the crabp1 Promoter</td>
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<td>1:45</td>
<td>Kristine LeClair ’15</td>
<td>Thyroid Hormone Regulation of Fatty Acid Synthase in Pregnancy Associated Breast Cancer</td>
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<td>2:00</td>
<td>Hieu Nguyen ’15</td>
<td>The Effect of Montamine Analogs on E. coli and S. aureus Growth</td>
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<td>2:15</td>
<td>Elise Prayson ’15</td>
<td>Cellular Retinoic Acid Binding Protein 1 (crabp1) Promotes Pregnancy Associated Breast Cancer - Breast Cancer Diagnosed During or within a Year of Pregnancy</td>
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<tr>
<td>1:00</td>
<td>Adam Johnson ’15</td>
<td>Police Stress and the Relation to Personal Lives</td>
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<td>1:15</td>
<td>Mitchell Kelly ’15</td>
<td>The Impact of Broken Windows Theory on the Use and Distribution of Heroin</td>
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<td>1:30</td>
<td>Sean Mayo ’15</td>
<td>Prosecutor Turnover</td>
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<td>1:45</td>
<td>Claire Toole ’15</td>
<td>Gender Differences in Views on Crime and Punishment among Assistant District Attorneys</td>
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<td>2:00</td>
<td>Daniel Murphy ’15</td>
<td>Cultures in Small Sized Police Departments</td>
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<td>2:15</td>
<td>Nicole Cote ’15</td>
<td>Probation Officers Attitudes towards “Changing Lives through Literature” Programs</td>
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<tr>
<td>9:00</td>
<td>Jenna Connors ’15</td>
<td><em>The Second Amendment from the Founding to the Reconstruction Era: The Contrast between Federal vs. State Regulation</em></td>
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<td>9:15</td>
<td>Jessica Heywood ’15</td>
<td><em>Guantanamo Bay and the End of the AUMF</em></td>
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<td>9:30</td>
<td>Pablo Sierra-Carmona ’15</td>
<td><em>The Chief Justices: Marshall v. Roberts</em></td>
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<tr>
<td>9:45</td>
<td>Meagan Kullberg ’15</td>
<td><em>The Role of Social Studies Education in Elementary Curricula during the Era of Accountability</em></td>
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<tr>
<td>10:00</td>
<td>Jason Duke ’15</td>
<td><em>A New Perspective: Telling the Story of the Shanghai Refugees from Nazi Germany through the Eyes of a Child</em></td>
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<td>10:15</td>
<td>Kara Lessels ’15</td>
<td><em>All Steamed Up</em></td>
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<td>Shaun Bradley ’15</td>
<td><em>Restoring the Sacredness of Sex and Marriage</em></td>
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<td>9:15</td>
<td>Lucas LaRoche ’16</td>
<td><em>The Efficaciousness of Rites of Exorcism</em></td>
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<tr>
<td>9:30</td>
<td>Donald Urso CCE ’15</td>
<td><em>The Fork in the Road: The Converging Paths of a Past and Present Christian Mysticism</em></td>
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<td>9:45</td>
<td>Zebb Duffany ’15</td>
<td><em>An Argument Against Kant’s Antinomies of Pure Reason</em></td>
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<td>10:00</td>
<td>Nicole Riel ’15</td>
<td><em>Doing and Knowing: The Relationship between Politics and Philosophy in Aristotle's Ethics</em></td>
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<td>1:00</td>
<td>Samantha Manzello '15</td>
<td><em>Serendipity by Design: Film Marketing on Social Media</em></td>
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<td>1:15</td>
<td>Kathryn Cullerot '15</td>
<td><em>The Lunchbox: A Taste of Business Planning</em></td>
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<td>1:30</td>
<td>Meaghan Ekstrom '15</td>
<td><em>The Mass Media’s Fictional Truth about Ebola</em></td>
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<tr>
<td>1:45</td>
<td>Kelly Black ’15</td>
<td><em>Exploring Post World War I Art of Otto Dix and George Grosz</em></td>
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<tr>
<td>2:00</td>
<td>Joshua Stopyra ’16</td>
<td><em>Art and the Paris Commune of 1870-1871: A Study of the Commune’s Effects on the World of Art</em></td>
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<tr>
<td>2:15</td>
<td>Kaitlyn Poirier ’15</td>
<td><em>Cooking with Crohn's Disease - Microbiota in the Mix</em></td>
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<td>Natalie Schmitt ’15</td>
<td><em>From Lab Benches to Hospitals: Investigating the Causes and Treatment Methods of ALS</em></td>
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<td>1:15</td>
<td>Nicole Stantial ’15</td>
<td><em>Transcription-Coupled Repair: Maintaining the Integrity of the DNA in Haloferax Volcanii</em></td>
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<td>1:30</td>
<td>Jonathan Duarte ’16, Josep Rose ‘17, &amp; Evan Villanova ’15</td>
<td><em>Algebraic &amp; Combinatorial Properties of the s-t-Catalans</em></td>
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<tr>
<td>1:45</td>
<td>James Lentini ’15</td>
<td><em>A Potential to Decrease Obesity</em></td>
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<td>2:00</td>
<td>Melanie McCauley ’15</td>
<td><em>An Investigation of Renewable Energy Projects at Assumption College: Wind Turbines and Geothermal Heat Pumps</em></td>
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<td>2:15</td>
<td>Alex Parisi ’15</td>
<td><em>To Each Their Own: Examining FFP in European Football</em></td>
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<td>2:30</td>
<td>Kaitlyn Bouthillette ’15</td>
<td><em>The Benefits of Giving Back: Volunteerism in Adolescence and Early Adulthood</em></td>
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<td>2:45</td>
<td>Jason Duke ’15</td>
<td>Eighteenth-Century Book Advertisement via Magazine Wrappers and Newspapers</td>
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<td>3:00</td>
<td>Daniel Murphy ’15</td>
<td>WWII Non-Combat Aggression of the U.S. 45th Infantry Division</td>
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<td>3:15</td>
<td>Erich Grosse ’15 &amp; Mia-Michelle Russell ’15</td>
<td>Worcester Memorial Building</td>
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<td>3:30</td>
<td>Nicholas Commesso ’17, Jonathan Kezer ’15, Caitlin Miller ’15, &amp; Candace Ruby ’15</td>
<td>Preserving the Higgins Armory Museum</td>
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<td>3:45</td>
<td>Connor Anderson ’15 &amp; Samantha Davis ’17</td>
<td>Video Presentation - Preserving Worcester's Central Building</td>
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<td>Richard Novio ’15</td>
<td>The Cask of Amontillado: Reimagined as a Short Film</td>
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<td>Kyler Huffert ’15 &amp; Lauren Johnson ’15</td>
<td>Changing Kinematics While Walking and Jogging with a Jogging Stroller</td>
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<td>Juan Toscano ’16</td>
<td>Analysis of eHsp90 Regulation of Secreted Exosomes from Cancer Tumor Cells</td>
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<td>Anna Gill ’16 &amp; Kaitlyn Riley ’16</td>
<td>Effects of Serotonin, Octopamine, and DHEA on Aggressive Behaviors in the Crayfish, Cambarus Bartonii</td>
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<td>Christine McCarthy ’15</td>
<td>Effects on Vegetation from Forest Fires at Perkins Farm</td>
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<td>Priya Ahluwalia ’15, Mary Gonring ’15, &amp; Cassie Lincoln ’15</td>
<td>Examination of ina-1 Mutants in Caenorhabditis Elegans to Better Understand Axonal Patterning</td>
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<td>Timothy Bates ’16, Bianca Monaco ’16, &amp; Kayleigh Murphy ’16</td>
<td>Free Energy Rate Density and Self-Organization in Complex Systems</td>
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<td>Lauren Pepi ’15</td>
<td>Instrumental Analysis of Various Oils</td>
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<td>Investigating Inhibition of Host Cell Cycle on BK Virus Infection</td>
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<td>Madelaine Duarte ’16</td>
<td>Isolation and Preliminary Characterization of a Novel Ultraviolet Light Resistant Mutant in the Archaeon Haloferax Volcanii</td>
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<td>Shannon Martin ’15</td>
<td>Localization of EFHC1 Protein in Tetrahymena Thermophila Axonemes Using Cryo-Et.</td>
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<td>Sinead Sinnott ’15</td>
<td>Perceptions and Prevalence of Mindfulness and Meditation Among College Students</td>
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ABSTRACTS

Presentation Session 1A
Monday, April 20
9:00-10:30 a.m. La Maison Salon

Angels in Training: A Feminist Analysis of the Heroines and Mentors of Newbery Gold
Brianna Abbott ’15
English

This study includes an in-depth analysis of the development of young female protagonists over the course of their respective stories in eight Newbery Award novels. The heroines are analyzed in terms of growth using feminist criticism to ascertain whether or not each perpetuates traditional or nontraditional female stereotypes. To detect any patterns in growth, each story is broken into a series of successive trials, and in each trial a mentor or guardian figure is identified. The nature of the trials, and the heroine’s dependency on her mentor in each, provides evidence regarding each heroine’s level of independence over the course of the novel as well as the types of skills she is expected to master. The data gathered supports the conclusion that many of these female protagonists exhibit predominantly feminine stereotypes and develop skills which enable them to grow into traditional domestic roles.

Faculty Mentor: Dr. Mary Kielbasa

Breaking Lolita - The Novel, the Films, and the Myth
Vanessa Arroyo ’15
English

*Lolita* by Vladimir Nabokov tells the enticing tale of professor Humbert Humbert and his obsession with 12 year-old Dolores Haze. At first the novel was viewed as the story of a young girl who was kidnapped and abused by a man she trusted. However, after two film adaptations that beautified and sexualized the juvenile victim, the term "Lolita" is now used by the patriarchal society to label women and young girls as deviant sexual temptresses.

By conducting a feminist analysis of the 1962 and 1997 films, a new view of Lolita will be seen. Media outlets quickly absorbed this view of Lolita as the seducer in the novel in order to describe any and every young woman in society that exudes sex appeal. My analysis of the film, modern music and magazine works, and the impact of the media, reveals the weakness of the male-gaze dominated world and the strengths of a heart-shaped lens world in the current 21st century. In the end, it is a battle between the perspectives to see which speaks truer to the novel, which like Lolita herself, has been silenced and pushed away for others to manipulate its story.

Faculty Mentor: Dr. Paul Shields

Across the Literary Pond:
Examining the Cross-Cultural Reception of Alcott’s Little Women and Austen’s Pride and Prejudice
Caitlin Miller ’15
History

Although written in two different countries, during two different time periods, and from two different cultures, Jane Austen’s *Pride and Prejudice* and Louisa May Alcott’s *Little Women* are two novels that have endured in popularity for generations of readers. For my research project, I wanted to look at the thread that ties these two novels together: Elizabeth Bennet and Jo March, the strong female heroines that lie at the center of the stories. For my research project, I wanted to answer the question: How do the cross-cultural responses to the novels, including praise and criticism, reveal how Elizabeth Bennet and Jo March both challenged and reinforced the sociocultural expectations of the time periods in which these novels were written in England and the United States? In order to answer this question, I examined contemporary and modern reactions to the two novels in order to determine how British and American critics and readers responded to these heroines both in the past
and in the present. I also will provide historical background on women’s roles and the history of both novels. Viewing the books through a cross-cultural analytical lens demonstrates not only the enduring qualities of the heroines, but also the manner in which literature is shaped by culture.

Faculty Mentor: Dr. John McClcymer

Drihten and Pegn
Erin Burkart ’15
English

I examine the bond of comitatus (the complex relationship between drihten [war leader] and pegn [thane]) in the Dream of the Rood that is manifested between Christ and the tree. Furthermore, I also examine how that relationship would have presented Old English readers with an interesting paradox.

Faculty Mentor: Dr. Bryan Carella

The Implicit Imperialists: The Disnification of American Hegemony in the Middle East 1990-1991
Sara Heath ’15
History

For decades, the United States government and Disney Corporation have propped one another up both economically and culturally. This mutually supportive relationship was already evident prior to the Second World War when the US government commissioned Disney to produce cartoon shorts in support of U.S. foreign policy in Europe. In 1992, Disney released Aladdin, coinciding with the end of the First Persian Gulf War. The film contained many “Orientalist,” or racially themed, images and attitudes that the West has manifested towards Middle and Far Eastern peoples throughout contemporary history. An examination of this film, and a comparison of Aladdin’s racial overtones with U.S. speech propaganda during the war, illuminates the tense recent history of U.S. and Middle Eastern relations. The project thereby raises significant questions about the nature of U.S. imperial power as well as the relationship between the U.S. government and major media outlets.

Faculty Mentor: Dr. Deborah Kisatsky

A Creative Screenplay - The Apple Tree
Andrea Kolodziej ’15
English

“A Creative Screenplay” is an honors thesis project linking creative screenwriting with community service learning. The screenplay is titled The Apple Tree, and was created with extensive prior research of both screenwriting and homelessness. The goal of The Apple Tree is to inspire a female teen target audience with a genuine story about overcoming hardships and demonstrating true realities of homelessness. The story is about a homeless girl who overcomes life on the streets, while searching for her long lost brother. It is a story about fate and includes an unexpected twist at the end. The screenplay aims to spread the message that homeless individuals are not that different from anyone else in society. The screenplay intends to simultaneously teach and entertain its audience. The presentation will demonstrate the planning process of the screenplay, its importance, and the overall outcome of the screenplay.

Faculty Mentor: Dr. Paul Shields
Man’s Best Friend: Variations in Emotions, Emotion Regulation, and Affinity for Dogs
Carrie Abreu ’16
Psychology

Every day, situations require us to use behavioral, biological, and cognitive processes to manage our emotions, a process called emotion regulation (ER). As one of the most common forms of ER is to spend time with loved ones, exposure to pets could be a powerful way of regulating emotion. In the current study, we examined whether people reporting a high affinity for dogs react more positively to dogs than more generally positive stimuli. Participants reported on their experience with dogs, and then completed an image task in which they were exposed to a brief social threat (negative faces with captions of criticism), followed by an image from one of three categories (dog, positive control, neutral). People who report high affinity for dogs report turning to them to regulate their emotions, and doing so appears to relate to a situation-selection-based form of ER. These people also experience a particular benefit from being exposed to dogs (vs. generally positive stimuli) after the social introduction of threat. These findings could have relevance for the "pet effect," or the positive impact that dogs have on people’s physical health and mental well-being.

Faculty Mentor: Dr. Sarah Cavanagh

The Power of Play: Characteristics of Video Game Players and the Effects of Gameplay on Flow
Emily Sansivero ’15
Psychology

Researchers studying video game players and the effects of gaming have largely focused on the negative, exploring topics like addiction and aggression. Fewer studies have investigated possible positive effects of gaming on emotion. In the present study, we recruited fifty-eight Assumption College undergraduates. We introduced a mild form of stress and then randomly assigned participants to play one of two video games (one involving narrative immersion, one not) or to passively view gameplay. In between each task, participants rated their moods and experiences. Our results indicate that participants who report playing video games at least weekly report playing games in order to regulate their emotions and score higher than non-gamers on a personality variable called openness to experience. Playing either video game led to a greater experience of flow, an emotional state known to be associated with well-being, than the passive view condition. Future research should explore these findings in larger samples of both gamers and non-gamers.

Faculty Mentor: Dr. Sarah Cavanagh

Perception of Movement Synchronization Differences in Autism Spectrum Disorder
Katherine Schmidt ’15
Psychology

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by social difficulties in cooperating and collaborating with others. Some research suggests these social problems may be due to deficiencies in social cognitive abilities like imitation or theory of mind. Other research has suggested the social disconnection may be due to problems with the more subtle coordination or synchronization of bodies that happens during social exchanges, referred to as social motor coordination. Little is known, however, about whether individuals can perceive disrupted patterns of social motor coordination. This thesis examined whether typically developing individuals have the ability to detect and perceive synchronization movement differences of individuals with autism. Participants viewed videos of children with and without autism performing social motor acts and rated their perceptions of the characteristics of the movements and the likelihood each child had a diagnosis of autism. Overall, the videos of children with autism were rated as more likely to be diagnosed with autism than the videos of typically developing children. This indicates that the diagnosis of autism can be perceived through biological motion. The perceptual dimensions of synchronization further differentiated
likelihood scores implying that these dimensions are related to individuals' perception of how likely a person is to have autism.

Faculty Mentor: Dr. Paula Fitzpatrick

Comorbidity of ADHD and Anxiety Disorders in Children and Adolescents
Andrea Garry ’15
Psychology

Attention Deficit Hyperactivity Disorder (ADHD) and Major Depressive Disorder (MDD) are two common disorders among children and adolescents. Due to the common occurrence of these disorders and their prognosis, especially in combination, we studied ADHD and MDD in a sample of ages 3-18 year-olds referred to the Outpatient Pediatric Psychopharmacology Clinic at the University of Massachusetts Medical School (N = 310). After grouping diagnoses into those with ADHD and MDD (N = 108), ADHD only (N = 137), and MDD only (N = 26), we examined the relationship between ADHD and MDD and the relationship with parental psychopathology and parental income. Results show that there were significant group differences between several reported parental psychological disorders. There were also significant group differences for age and one stressful life factor. The present findings also suggest that aggression may be a significant problem for youths who present with co-occurring ADHD and depression. These youths exhibited significantly higher levels of psychopathology and higher levels of proactive aggression, which is an emotionally-driven form of aggression. Findings suggest that clinicians should assess aggressive behaviors in youth with co-occurring ADHD and depression.

Faculty Mentor: Dr. Leonard Doerfler

Presentation Session 2A
Monday, April 20
1:00-2:30 p.m. La Maison Salon

A Comparative Study of Brain-Computer Control of Robotic Devices vs. Brain-Nerve Driven Control of Artificial Limbs
Rebecca Corridori ’15
Natural Sciences

Prosthetic technology is a rapidly expanding sector of the medical industry that strives to restore movement and sensation in individuals who suffer from motor impairment. In the United States and around the world, hundreds of thousands of individuals struggle to partake in activities of daily living because of their loss of upper limb function due to weakness, paralysis, or amputation. Researchers have made progress in the development of prosthetic techniques for the upper extremity, creating techniques capable of providing accurate movements and sensory information to users. New surgical techniques, particularly those utilizing brain-controlled interfaces (BCIs) and targeted reinnervation (TR), aim to restore function and sensation to impaired individuals. Both of these techniques cater to particular groups of individuals, but for future implementation in patients, one will prevail due to its diversity in controlling motor function and restoring sensation.

Faculty Mentor: Dr. Stuart Cromarty

Evaluation of the i-STAT Hematocrit and Hemoglobin Tests
Joseph Douglass ’15
Natural Sciences

Measuring the percentage of red blood cells to the overall blood volume, known as the hematocrit, is an integral aspect of determining the need for administering blood transfusions. The use of point-of-care (POC) analyzers, which can operate at the site of the patient, can serve an important role in this time-sensitive clinical scenario. Conductivity-based POC analyzers, such as the i-STAT device, allow for rapid detection of hematocrit values through blood conductivity measurements, and hemoglobin values through calculation. However, the appropriateness of such conductivity-based devices has been questioned for situations in which the patient is
undergoing cardiac bypass surgery or has already received blood transfusions. Analyses of the i-STAT hematocrit and hemoglobin tests were conducted in conjunction with the reference method ("gold standard") for hematocrit measurement, along with other common hematocrit and hemoglobin measurement methods. These methods provided a means for comparison to the i-STAT device. Blood samples were collected from both cardiopulmonary bypass patients and non-cardiopulmonary bypass patients to assess the validity and interchangeability of the i-STAT in clinical practice. The i-STAT hematocrit and hemoglobin tests compared clinically favorable to the "gold standard" and other measurement methods.

Faculty Mentor: Dr. Aisling Dugan

**Thyroid Hormone Regulation of the crabp1 Promoter**
Abigail Heroth ’15  
Natural Sciences

Pregnancy associated breast cancer (PABC) is breast cancer that is diagnosed during or within one year after pregnancy. Prior research has shown that a specific gene, cellular retinoic acid binding protein 1 (crabp1), promotes aggressive tumor growth within the breast during lactation. However, both the function and the regulation of crabp1 within the breast are unknown. We hypothesized that thyroid hormone (T3), which is required for lactation, is causing the increased expression of the crabp1 gene. To test the hypothesis we treated NIH3T3 cells with T3. NIH3T3 cells are fibroblasts that mimic cells of the mammary gland with respect to crabp1 function. We then measured the promoter activity of crabp1 using a Luciferase assay, and its protein levels using Western blots. Results suggest that long term T3 treatment leads to an increase in crabp1 protein expression. This research is important in furthering our understanding of the crabp1 regulation in the mammary gland. Knowing how the gene is regulated may allow us to alter its expression and potentially decrease the aggressiveness of PABC.

Faculty Mentor: Dr. Jessica McCready

**Thyroid Hormone Regulation of Fatty Acid Synthase in Pregnancy Associated Breast Cancer**
Kristine LeClair ’15  
Natural Sciences

Pregnancy Associated Breast Cancer (PABC) is breast cancer that is diagnosed during pregnancy, during lactation, or in the first postpartum year. It accounts for 3% of all breast cancers and 20% of those in pre-menopausal women. It is a particularly aggressive form of cancer with a mortality rate 50% higher than other breast cancers. During mammary gland development, breast tissue undergoes structural changes in the adipose stromal cells (ASC). ASCs isolated from nulliparous (never been pregnant) mice (ASC-N) are lipid filled, whereas ASCs isolated from lactating mice (ASC-L) are lipid depleted. A gene has been identified that contributes to lipid depletion, as well as tumor promotion, called cellular retinoic acid binding protein 1 (crabp1). One way crabp1 is regulated is through thyroid hormone (T3). Previous research shows that T3 is required for lactation and preliminary lab results indicate that T3 increases crabp1 expression. Since fatty acid synthase (FAS) also regulates lipid accumulation in cells, it was hypothesized that T3 decreases FAS in mammary gland stromal cells. NIH3T3 cells (cells with similar crabp1 function and levels) were treated with T3 for 24 hours. RNA and protein were collected and qPCR and western blots were performed. T3 significantly reduced FAS RNA and protein levels by a 2.5-fold decrease relative to the untreated sample. Further studies are in progress to link the decrease in FAS in T3 treated cells to the crabp1 gene.

Faculty Mentor: Dr. Jessica McCready

**The Effect of Montamine Analogs on E. coli and S. aureus Growth**
Hieu Nguyen ’15  
Natural Sciences

Montamine is a novel organic compound that was isolated from the seeds of the reddish purple mountain-flower *Centaurea montana* in 2006. Montamine is classified as a dimeric indole alkaloid with a unique N,N'-diacyl hydrazine core structure. Montamine has been reported to display moderate antioxidant properties and anti-cancer activity against the colon cancer cell line CaCo-2. The other bioactivities of montamine have not been
evaluated. In this study, three montamine analogs (butyl-montamine, phenyl-montamine, and methoxy-montamine) were evaluated for their antibacterial effects on the bacterial species, *Staphylococcus aureus* and *Escherichia coli*. Using a standard disk diffusion assay, montamine analogs showed little to no ability to inhibit either bacteria at a 200 µM concentration. Montamine analogs were also tested at 200 µM concentration using a bacterial growth curve assay. This assay showed that the analogs induced a very modest inhibition in bacterial growth at 4 hours post-treatment. Using a CFU plate count, an inhibition of 18.4% for phenyl-montamine and 41.5% for butyl-montamine was confirmed by counting the surviving *S. aureus* bacterial cells 4 hours after a 200 µM concentration of the analog was added, thus suggesting that phenyl-montamine and butyl-montamine had the most significant inhibition on *S. aureus*. Furthermore, the modest bacterial growth inhibition of the three montamine analogs may provide insight into the function of montamine for plant survival and suggests montamine might be developed as a plausible antibacterial drug. Because of the modest antibacterial effect we observed, other montamine analogs, montamine itself, and its monomer moschamine should be also screened for their effect on bacterial growth.

*Faculty Mentor: Dr. Aisling Dugan*

**Cellular Retinoic Acid Binding Protein 1 (crabp1) Promotes Pregnancy Associated Breast Cancer - Breast Cancer Diagnosed During or within a Year of Pregnancy**

Elise Prayson ’15  
Natural Sciences

Adipose stromal cells that are isolated from the mammary gland during lactation (ASC-L) express higher levels of crabp1 when compared to adipose stromal cells isolated from a mammary gland in a mouse that has never been pregnant (ASC-N). Previous research has shown that ASC-Ls promote more aggressive tumors than ASC-Ns due to the amount of crabp1 present in the cells. One function of crabp1 is to regulate the amount of lipid in cells, however the function and regulation of crabp1 in the mammary gland is currently unknown. Prior data from our lab and others suggests that thyroid hormone (T3) may increase crabp1 gene expression. We hypothesized that as the crabp1 levels increase, due to thyroid hormone treatment, lipid accumulation would decrease. To test this hypothesis, we treated cells with thyroid hormone and performed lipid accumulation assays and Oil Red O staining to determine the amount of lipid in the cells. We also conducted semi-qPCR to determine the amount of fatty acid synthase (FAS) and crabp1 present in cells during the lipid accumulation assays. Our data suggest that thyroid hormone treatment of ASC-Ns increases crabp1 expression and decreases lipid accumulation thereby causing a phenotypic change. This research extends our studies on the role of crabp1 function in the mammary gland and will lead to a greater understanding of its function in pregnancy associated breast cancer.

*Faculty Mentor: Dr. Jessica McCready*
Police Stress and the Relation to Personal Lives
Adam Johnson ’15
Sociology, Criminology and Anthropology
Stress from police work causes strain between the police officer’s job and personal life. There are many different causes of work-related stress. Everybody in the world deals with stress in a different way, and that goes for police officers as well. The purpose of this study is to see what stress is caused by police work and how this stress is brought back into their personal lives. Furthermore, I want to explore how police officers deal with their stress on a daily basis.

Faculty Mentor: Dr. Alison Cares

The Impact of Broken Windows Theory on the Use and Distribution of Heroin
Mitchell Kelly ’15
Sociology, Criminology and Anthropology
Using first-hand accounts, this study examines the implications of the Broken Windows Theory.

Faculty Mentor: Dr. Alison Cares

Prosecutor Turnover
Sean Mayo ’15
Sociology, Criminology and Anthropology
My study examines why a prosecutor’s job is stressful and why so many choose to leave the field. There are many different reasons why some may choose to leave but there has been no research done to show a determinant reason. My research will narrow down crucial reasons to answer the question why there is such a high rate of prosecutorial turnover in the U.S.

Faculty Mentor: Dr. Alison Cares

Gender Differences in Views on Crime and Punishment among Assistant District Attorneys
Claire Toole ’15
Sociology, Criminology and Anthropology
How does gender affect how assistant district attorneys view crime and punishment? It could be a main factor in decisions regarding whether or not to indict defendants and on what charges. Qualitative interviews explore how gender may affect these decisions on crime and punishment. This study compares and contrasts the views of male and female assistant district attorneys on what crimes deserve what types of punishments.

Faculty Mentor: Dr. Alison Cares

Cultures in Small Sized Police Departments
Daniel Murphy ’15
Sociology, Criminology and Anthropology
Responses to interviews of employees of a small Massachusetts police department are analyzed to determine how they reflect the culture of the department as a whole.

Faculty Mentor: Dr. Alison Cares
Probation Officers Attitudes towards “Changing Lives through Literature” Programs
Nicole Cote ’15
Sociology, Criminology and Anthropology

“Changing Lives through Literature” is a rehabilitation program used in various places such as Texas and Massachusetts. This study is being used to look at the attitudes of the people who are involved in the program and who are not involved in the program. The goal is to see whether their attitudes towards the program and the clients have either a positive or negative effect on the final outcome.

Faculty Mentor: Dr. Alison Cares

Presentation Session 3A
Tuesday, April 21
9:00-10:30 a.m. La Maison Salon

The Second Amendment from the Founding to the Reconstruction Era:
The Contrast between Federal vs. State Regulation
Jenna Connors ’15
Political Science

A closer analysis of the period from Revolutionary American through the Reconstruction Era shows the "original intent" of the Second Amendment of the Constitution of the United States, or the right to bear arms. Although controversies question the individualistic interpretation of the Second Amendment, these closer readings show that the debate is between state and federal regulation of firearms. Many nineteenth century events, such as the Civil War, influenced the interpretation of the Second Amendment. Supreme Court decisions also influence the interpretation of the Second Amendment because, while having reverence for the past, the Supreme Court interprets the Bill of Rights through current scholarly understanding.

Faculty Mentor: Dr. Mary Burke

Guantanamo Bay and the End of the AUMF
Jessica Heywood ’15
Political Science

Since the attacks against American citizens on September 11, 2001, the U.S. has been entrenched in a protracted war against a new and subversive enemy. In an effort to prevent future attacks, the administration of George W. Bush sought to gain intelligence and prevent captured combatants from rejoining the enemy. In line with these goals, President Bush transformed a U.S. naval base located in Guantanamo Bay, Cuba into a detention camp for captured unlawful combatants. This base seemed the perfect location for the high security detention center as it held a unique position in history and in the legal domain. Contrary to hopes of Bush’s administration, Guantanamo Bay drew significant attention and came under the scrutiny of U.S. Courts. Despite multiple Supreme Court rulings and a change in President, Guantanamo remains in use, currently holding 122 detainees. Between feeble Court decisions which did little to fundamentally challenge Guantanamo detention and continuous extensions of the War on Terror, the base-made-prison stands to remain operational until an administration empties it completely or an act of Congress discontinues the open-ended 2001 Authorization for Use of Military Force.

Faculty Mentor: Dr. Gregory Weiner

The Chief Justices: Marshall v. Roberts
Pablo Sierra-Carmona ’15
Political Science

Under the leadership of Chief Justice John Marshall, the United States Supreme Court used for the first time judicial review in Marbury v. Madison. Judicial review is the doctrine where judges review acts by the
Legislature and the Executive. This doctrine has now become a widely accepted power the judiciary possesses to strike down acts—whether by the Legislature or the Executive—as unconstitutional. This power has led many to believe the Judiciary is a check on Congress and the President. Chief Justice Marshall used federal judicial review only once during his 34 years in the Supreme Court. However, in the most recent Courts, like Chief Justice John Roberts', this power has been used numerous times. This thesis explores Chief Justices Marshall and Roberts' theories on the proper role of the Judiciary in our constitutional system.

Faculty Mentor: Dr. Gregory Weiner

The Role of Social Studies Education in Elementary Curricula during the Era of Accountability
Meagan Kullberg ’15
Education

Current literature suggests social studies education is being marginalized in elementary classrooms while content areas emphasized on high-stakes exams receive more instructional time. In Massachusetts, high-stakes exams focus on English language arts and mathematics. As a result, teachers are pushed to make decisions due to time constraints. This project addressed asks how has the role of social studies education been marginalized in elementary curriculum during a current era of accountability? Eight third grade public school teachers in Worcester County were interviewed about their social studies instruction and the broader field of social studies education. Qualitative analysis of interview data was completed and results indicated, on average, social studies content is taught just 95 minutes per week. Therefore, implementations were devised including a 15-lesson unit plan for third grade on the American Revolution utilizing content integration. Content integration is an educational approach which exposes students to comprehensive understandings within and across disciplines. Content integration emphasizes building disciplinary literacy in social studies through the development of skills and competencies found in the recently adopted Common Core Standards.

Faculty Mentor: Dr. Lisa D’Souza

A New Perspective: Telling the Story of the Shanghai Refugees from Nazi Germany through the Eyes of a Child
Jason Duke ’15
History

This project looks at an understudied group of people, the Shanghai refugees from Nazi Germany. While the events of World War II and the Holocaust are quite well-known, this project concentrates on a relatively unknown chapter in the larger story. While the goal of this thesis was to develop a complete historiography of the Shanghai refugees, it also added to the academic study of these Jews from Nazi Germany by recording the story of my Grandmother, Tanja Olson, who was one of many who found safety in Shanghai. Thus, the project weaves the tale of Tanja together with the general history of the Shanghai refugees, while noting the similarities and differences between the two, in order to understand how a child’s perspective affects the overall account of these refugees’ time in Shanghai.

Faculty Mentor: Dr. Mark Christensen

All Steamed Up
Kara Lessels ’15
History

This study examines the technological transition of the US Navy from 1869 to 1898 and the causes behind that transformation. It looks at the reasons why the Navy resisted any change to its fleet in the 1870s and traces the factors leading to its more rapid transformation in the late 1880s and early 1890s.

Faculty Mentor: Dr. John McClymer
Today, sex and marriage are constantly discussed topics because everyone seems to have an opinion on what they should be. Is there a problem with the "hook-up culture," or is sex acceptable whenever the two people are consenting adults? Are males and females actually different, or are these terms just societal constructs? Is marriage supposed to be permanent and exclusive, or should divorce be seen as the solution to all marital problems? Does marriage have to be between a man and a woman, or does any combination of genders constitute a valid marriage? These questions serve as the basis of this paper, which examines the Catholic Church's teachings, the pain and suffering that come from the modern world's treatment of sex and marriage, and how to restore them to the great human goods God intended them to be.

Faculty Mentor: Dr. Christopher Klofft

The Efficaciousness of Rites of Exorcism
Lucas LaRoche '16
Theology
Since the publication of the post-conciliar Rite of Exorcism, exorcists have made various comments indicating that the new Rite is less effective than the previous Rite, found in the pre-conciliar Rituale Romanum. In 2014, the United States Conference of Catholic Bishops approved a new English translation of the Rite of Exorcism, hoping that it would be more effective. This paper will analyze the language of the Rites to attempt to discover why certain translations are more effective than others, and the role of language in the celebration of this and related sacramentals.

Faculty Mentor: Dr. Christopher Klofft

The Fork in the Road: The Converging Paths of a Past and Present Christian Mysticism
Donald Urso CCE ‘15
Theology
A comparative study of the spiritual paths of Christian mystics towards theosis or divinization. This study will examine the apaphatic and kataphatic approaches of experiencing God and the continuation of seeking and understanding the Divine will.

Faculty Mentor: Dr. Virginia Kimball

An Argument Against Kant's Antinomies of Pure Reason
Zebb Duffany ’15
Philosophy
In the Critique of Pure Reason, Kant argues that reason cannot know anything beyond the physical universe, and that any attempt to do so will necessarily end in logical contradictions. In my presentation I will argue that this is not the case, and that reason may have the ability to explore metaphysical questions without falling into endless contradiction.

Faculty Mentor: Dr. Anthony Traylor
Doing and Knowing: The Relationship between Politics and Philosophy in Aristotle’s Ethics
Nicole Riel ‘15
Philosophy

There are multiple ways to formulate the question I examine using Aristotle’s Ethics, Metaphysics, and Politics. What is the relationship between doing and knowing in Aristotle’s work? Is Aristotle’s Ethics primarily concerned with action, knowledge, or knowledge for the sake of action? In what ways is a contemplative life of philosophy superior to an active life of politics, and vice versa? Is beautiful action a distinctively human way one can share in the divine in a way similar to how the human intellect shares in the divine? Is the way in which beautiful actions are beautiful and beautiful thought is beautiful the same, or is there a hierarchical way in which one is systematically better? When is the best man the same as the best citizen? Does man belong in and to the political community, or does the political community exist to serve a human good superior to political life? These may look like different questions, but for Aristotle, they all relate to a fundamental issue that is explored throughout his work: whether the human being and his good are merely in the world, or whether he and his good also somehow transcend it.

Faculty Mentor: Dr. Molly Flynn

Presentation Session 4A
Tuesday, April 21
1:00-2:30 p.m. La Maison Salon

Serendipity by Design: Film Marketing on Social Media
Samantha Manzello ‘15
Business Studies

This project examines social media networking from its humble beginnings as a tool to connect people in an online community to its evolution into a pillar of an individual’s social life online and off. Social media networking has not only embedded itself into the social lives of individuals, but has evolved into a highly effective marketing tool. Marketers have had to adapt their styles and methods in order to properly employ social media as a form of communication. To trace this evolution from traditional marketing to digital marketing, this study focused on the film industry. By examining the successful social media marketing campaigns of two films, Ted and The Hunger Games, and primary survey research, this study provides insight into how to use social media effectively as a marketing tool.

Faculty Mentor: Dr. Cary LeBlanc

The Lunchbox: A Taste of Business Planning
Kathryn Cullerot ‘15
Business Studies

Small businesses have grown to become an essential element in the United States and international economies over the past sixty years. According to the Small Business Administration (SBA), the 23 million small businesses in the United States account for 54 percent of all U.S. sales. Small businesses provide over 50 percent of all jobs since the 1970s. However, the SBA writes that 50 percent of all small businesses in the United States fail within five years. The reasons they list for these failures include lack of experience, insufficient capital, and poor location. A preventative measure that must be implemented in order to avoid business failure is for the potential entrepreneur to create a business plan. My goal is to show the importance of a business plan through the development of my own. I will be describing the process from idea development, market research and business management, to the financial statements necessary to know the cost of the business. I will create a guide that will help to model the differences that women go through when it comes to business planning.

Faculty Mentor: Prof. David Hoyle
The Mass Media’s Fictional Truth about Ebola
Meaghan Ekstrom ’15

17,942. This is the number of Ebola cases that were confirmed world-wide between March 25th and December 10th 2014 ("Case Counts"). Of those who have contracted the viral disease, there have been a total of 6,388 deaths to date ("Case Counts"). Ebola is a fatal virus that is part of the Filoviridae genus. It uses a host cell as its infection mechanism and causes an acute serious illness in humans ("Ebola Virus Disease"). Until recently, it had been portrayed by the mass media as a threat only to the people of West Africa. The news coverage on this outbreak has immensely underplayed the severity of contracting the virus. As a country, the United States has not been accurately informed about the Ebola virus and its potential to harm many of our citizens. In order to survive a widespread disease, the mass media should spread awareness about important precautions, but instead they have chosen to falsify their reports. In turn, many are unaware of what this virus entails and why it is so dangerous.

Faculty Mentor: Dr. Becky DiBiasio

Exploring Post World War I Art of Otto Dix and George Grosz
Kelly Black ’15
Art, Music and Theatre

In the movement of Realism, artists employ their artistic abilities to communicate social issues to the audiences of their artworks. Realism took a particular path in the German Weimar Republic during the 1920s. The movement was called New Objectivity. New Objectivity was a return to objectivity and reality in art, poetry and music. Two main New Objectivity artists were Otto Dix and George Grosz, who used their art as a way of communicating their dissatisfaction towards the government. Grosz and Dix were opposed both to the government of the time and to the right wing political views of the rising political leader Adolf Hitler. Nevertheless, these artists were concerned with different aspects of politics and portrayed their messages in two distinct ways. George Grosz utilized a satirical approach to his paintings in comparison to Otto Dix who instead painted realistically to reveal war. These varying approaches may have resulted from differing artistic styles but also from differing experiences of World War I. For instance, Otto Dix fought on the frontline in many battles in World War I and as a result may have suffered from post-traumatic stress disorder, which may explain why his art focuses on the harsh realities of war.

Faculty Mentor: Dr. Toby Norris

Art and the Paris Commune of 1870-1871: A Study of the Commune’s Effects on the World of Art
Joshua Stopyra ’16
Art, Music and Theatre

Although a brief moment in France’s history, the rise and fall of the Paris Commune of 1870-1871 is both a pivotal and devastating time in French history. It is often discussed how the Commune is the birthplace of the Communist movement. Yet how did the politics of the Commune affect the world of art? As seen in artists such as Gustave Courbet, Edouard Manet, and Ernest Messionier, the Commune had a significant impact on the art community. Artists have always been seen as a left leaning group in the art community, yet the Paris Commune forced artists to pick a side. There were no neutral players during Paris’ riots and citizens who refused to pick a side were either exiled or killed. Politics and art are so interwoven during the time of the Commune that it becomes near impossible to separate one movement (the political aims of the Commune) with the other (the artistic expression of the Commune). It will be my purpose with this paper to explain the Commune’s effects on artists in Paris and the world of art in general. The Commune is often glanced over in history as a small revolutionary movement giving birth to Communist ideals, yet its impact on art is too important to ignore for any art historian studying 19th century France.

Faculty Mentor: Dr. Toby Norris
Cooking with Crohn's Disease - Microbiota in the Mix
Kaitlyn Poirier ’15
Natural Sciences

It seems as though people with Crohn's disease are involved in a Catch-22 situation. The current treatment methods of antibiotics, steroids, and immunosuppressants cultivate an unfavorable internal environment for beneficial gut flora. This, in turn, aggregates the symptoms of inflammation, abdominal pain, and diarrhea associated with the disease itself. Current treatments may only alleviate the disease activity in the short term while cultivating a problem that may contribute more to future disease symptoms. However, researchers are changing their approach to Crohn’s disease. Future treatment methods may forgo methods that disrupt the balance of the healthy microbiome, in favor of more natural means that actually utilize beneficial microorganisms to alleviate the patient’s disease symptoms. New research is showing that dietary manipulation of the gut microbiome through probiotics, prebiotics, and anti-inflammatory foods, may potentially help make a positive impact on the symptoms associated with Crohn’s disease.

Faculty Mentor: Dr. David Crowley

Presentation Session 4B
Tuesday, April 21
1:00-2:30 p.m. La Maison Hall

From Lab Benches to Hospitals: Investigating the Causes and Treatment Methods of ALS
Natalie Schmitt ’15
Natural Sciences

Interest in the neurodegenerative disease amyotrophic lateral sclerosis (ALS) has increased among researchers and caregivers alike as the incidence of the disease has risen. Using animal models, scientists have made great strides in ALS research, which have led to improvements in the care of ALS patients. A multidisciplinary approach to ALS treatment has been implemented at many ALS clinics, including the clinic at the Hospital for Special Care (HSC) in New Britain, CT. A study was conducted at HSC to gain an understanding of the ALS patient’s perspective on the efficacy of the multidisciplinary team in improving quality of life. Participants were given a questionnaire, which asked several questions regarding the participants’ opinions on the care they presently receive and any suggestions for improvement they may have. The data collected from this study will be analyzed and used to optimize the multidisciplinary team at HSC.

Faculty Mentor: Dr. Michele Lemons

Transcription-Coupled Repair: Maintaining the Integrity of the DNA in Haloferax Volcanii
Nicole Stantial ’15
Natural Sciences

DNA is essential for cell function, survival, and reproduction. DNA damage induced by ultraviolet (UV) light is inevitable because most organisms are exposed to sunlight in their natural environments. Therefore, it is important for organisms to have DNA repair mechanisms to maintain the structural and informational integrity of the DNA. One specialized type of DNA repair is called transcription-coupled repair (TCR) in which ultraviolet light induced DNA lesions in the transcribed strand of expressed genes are repaired more rapidly than lesions found in nontranscribed regions. TCR has been described in a number of eukaryotes and bacteria, but it has not been observed in the evolutionary and ecologically distinct domain of microorganisms called the Archaea. Through the use of a Southern blot based assay and 32P-labeled strand specific RNA probes, the use of TCR to repair UV induced DNA damage was tested in the halophilic archaeon Haloferax volcanii. It was found that the transcribed strand of an expressed gene was repaired at a faster rate than the nontranscribed strand. These results indicate that H. volcanii use TCR to repair DNA damage caused by UV. The evolutionary and implications of this discovery will be discussed, along with preliminary speculation about a potentially novel mechanism coupling RNA polymerase and DNA repair proteins.
Algebraic & Combinatorial Properties of the s-t-Catalans
Jonathan Duarte ’16, Josep Rose ’17, & Evan Villanova ’15
Mathematics and Computer Science

The Catalan numbers are a well-known object in Combinatorics. Research done by Sagan and Savage has led to the introduction of a new generalization called the s-t-Catalans. We looked into the algebraic and combinatorial properties of these polynomials.

A Potential to Decrease Obesity
James Lentini ’15
Economics and Global Studies

Increasing obesity rates causes more people to be at risk for obesity-related diseases. Treating for these diseases cost money for both the obese and everyone else. People who pay taxes or into pooled health insurance end up paying for treatment of obesity-related diseases. Obesity also causes indirect costs of lost productivity. Physical activity is a vital way to decrease body weight. The growing fitness company CrossFit could provide an environment that will decrease obesity. If the number of CrossFit gyms increases and leads to higher membership, obesity will decrease and lead to a decrease in medical expenditures for obesity-related diseases.

An Investigation of Renewable Energy Projects at Assumption College:
Wind Turbines and Geothermal Heat Pumps
Melanie McCauley ’15
Economics and Global Studies

This thesis researches the possibility of a renewable energy project specifically for Assumption College. As the school is already investing in solar power, my study looked at the feasibility of a wind turbine or geothermal heat pump unit on the campus. I conducted interviews with various institutions that have already undertaken similar projects so that I could better understand the process of installing these technologies, to discover possible funding that could be available, and the success of this technology in other schools. The economic advantages and the positive impacts on students and the neighboring communities were some of the benefits considered. I also conducted interviews with engineering and design companies to create a cost-benefit analysis. The thesis explains the pros and cons of the wind turbine and geothermal heat pump to determine the best course of action for Assumption College to “go green.”

To Each Their Own: Examining FFP in European Football
Alex Parisi ’15
Economics and Global Studies

UEFA’s introduction of Financial Fair Play in European Football leagues is an unsuitable attempt to stabilize the financial crisis in the European football industry. Every league licensed under UEFA should construct their own set of financial regulations so that they can be tailor-made to suit each league.
The Benefits of Giving Back: Volunteerism in Adolescence and Early Adulthood
Kaitlyn Bouthillette ’15
Sociology, Criminology and Anthropology

Volunteerism has been on the rise on college campuses for the past few decades. In response to this growing interest, opportunities to volunteer through local service, mission trips, and service learning classes have expanded. Researchers of this fairly new phenomenon have focused on the short and long term benefits of undergraduate volunteerism and why students volunteer. Research has also been conducted on high school volunteerism and its benefits. This study adds to the knowledge of volunteerism across the life span, focusing particularly on adolescence and young adulthood. This thesis attempts to fill in the gaps of previous research by looking at the connection between high school and college volunteerism, what makes undergraduate volunteerism meaningful, and which factors contribute to the continuation of volunteerism into college, during college, and beyond. To conduct this research, I surveyed undergraduate volunteers at one small private college in New England. Preliminary findings reveal the connections between motivations in high school and college to volunteer, factors that contribute to meaningful volunteer experiences for students, and students’ intentions to continue volunteering in college and into post-graduate life.

Faculty Mentor: Dr. Alison Cares

Eighteenth-Century Book Advertisement via Magazine Wrappers and Newspapers
Jason Duke ’15
History

This presentation pertains to my work for Professor Keyes as a Summer Research Fellow from the Honors Program. The two topics that I will be discussing are my experiences as a research fellow, as well as the information that I discovered in connection with Professor Keyes’ research. Over the summer of 2014, I looked at newspapers and magazine wrappers published in the late 18th and early 19th centuries. In particular, I searched for advertisements from George Helmbold and separate advertisements for a commemorative medal adorned with the likeness of George Washington. As a result of extensive research, I located many examples of both advertisements in various forms, which will help expand the scholarly work of Professor Keyes. These findings and their significance for Professor Keyes’ larger project will be the main focus of the presentation.

Faculty Mentor: Dr. Carl Keyes

WWII Non-Combat Aggression of the U.S. 45th Infantry Division
Daniel Murphy ’15
History

My presentation focuses on the turbulent history of the American 45th Infantry Division. Beginning with its creation as a Southwest National Guard Division and following the history of the group through its violent history as strikebreakers in Depression Era America, the paper culminates with the Division’s infamous executions of POWs in both the Italian and German campaigns of World War II. In an atmosphere filled with violence and cruelty, the actions of the 45th Infantry Division remain a mystery to the military historians of World War II. This project represents my attempts to make sense of this group and its actions.

Faculty Mentor: Dr. Thomas Wheatland

Worcester Memorial Building
Erich Grosse ’15 & Mia-Michelle Russell ’15
History

Memorial Auditorium is an historical building located on Lincoln Square in Worcester, Massachusetts. It
is currently listed on Preservation Worcester’s list of most endangered buildings in the city. For our Vocations in Public History course, taught by Professor Carl Keyes, we worked with Preservation Worcester to create a short documentary examining the historical significance of Memorial Auditorium and suggesting alternate uses that would prevent it from being demolished. By working alongside Deborah Packard from Preservation Worcester, diligently reading sources on the Preservation Worcester website, and examining city records of the building’s blueprints, we were able to come up with a plethora of solutions for the continued use of the Memorial Building.

By advocating the historical significance of the building as well as presenting possible new uses for the building, our group hopes that Worcester will see how important this building is and ultimately find other uses for it instead of demolishing such an historic structure. Without buildings from the past, cities will slowly lose their history and their character, and preserving such buildings, specifically Memorial Auditorium, can help prevent that from happening. Memorial Auditorium is a landmark site in Worcester and should be preserved for generations to come.

*Faculty Mentor: Dr. Carl Keyes*

**Preserving the Higgins Armory Museum**

Nicholas Commesso ’17, Jonathan Kezer ’15, Caitlin Miller ’15 and Candace Ruby ’15

**History**

We produced a short documentary about the Higgins Armory Museum, one of the city’s “most endangered” historic buildings identified by Preservation Worcester. Creating this documentary required several steps including researching and writing the script, filming exterior shots in front of the museum building, and recording interviews with individuals who had experienced the museum before it closed in December 2013. We also gained proficiency with iMovie to bring all the elements together. In order to raise awareness about this endangered site, we included information about the history of the building and its collection of arms and armor, its significance in the Worcester community, and its transition from a thriving museum to a bankrupt institution that recently closed its doors to the public. While the impressive collection was transferred to the Worcester Art Museum, the fate of the unique steel-and-glass museum building is still undetermined. In making a documentary about this memorable establishment we aimed to encourage viewers to advocate for the preservation of the Higgins Armory Museum as well as other historic institutions throughout this extraordinary city. This documentary was a Community Service Learning project, created in collaboration with Preservation Worcester, for "Vocations in Public History” during the Spring 2014 semester.

*Faculty Mentor: Dr. Carl Keyes*

**Video Presentation - Preserving Worcester's Central Building**

Connor Anderson ’15 & Samantha Davis ’17

**History**

This video presentation will profile Worcester's Central Building; a structure with historical significance which is on Preservation Worcester’s 2014 “Most Endangered Structures” list. In addition to highlighting its history and importance to the community, the video will also make the case for why the building’s preservation is essential.

*Faculty Mentor: Dr. Carl Keyes*
Poster Session  
Tuesday, April 21  
2:00-4:00 p.m. Testa Atrium  
(in order of discipline)

Yo  
Paola Trabanco ’15  
Art, Music and Theatre

A series of typographical posters in which I use photography to express my feelings and express how adapting to a new culture has shaped who I am today.

Faculty Mentors: Prof. Lynn Simmons & Prof. Scott Glushien

The Cask of Amontillado: Reimagined as a Short Film  
Richard Novio ’15  
English

The Cask of Amontillado, written in 1846 by Edgar Allen Poe, is the story of Montresor getting revenge upon the Fortunato family. However, Poe writes the famous short story in an ambiguous manner, never clarifying whom, if anyone, the audience of the story is for, an issue that can dramatically change the interpretation of the story. This screenplay adaptation of The Cask of Amontillado addresses this ambiguity left by Poe, and is the story of revenge, as told by Montresor to Fortunato’s grandson fifty years after Montresor murdered Fortunato.

Faculty Mentor: Dr. Becky Dibiasio

Changing Kinematics While Walking and Jogging with a Jogging Stroller  
Kyler Huffert ’15 & Lauren Johnson ’15  
Human Services and Rehabilitation Studies

Oxygen consumption while using a jogging stroller has been studied extensively, however the literature is lacking an examination of changing walking and jogging patterns while pushing a jogging stroller. Subjects were asked to walk at 1.3 m/sec and jog at 2.6 m/sec under three different loaded conditions: 1) no load, 2) pushing a jogging stroller with a 25lb added load, 3) pushing a jogging stroller with a 50lb added load. Three dimensional position data were collected using a Vicon motion capture system with 8 cameras at 150Hz. Kinematic variables including forward lean, stride length and stride frequency were calculated using MatLab.

Faculty Mentor: Dr. Robert Caron

Analysis of eHsp90 Regulation of Secreted Exosomes from Cancer Tumor Cells  
Juan Toscano ’16  
Natural Sciences

Cancer is most deadly at metastatic stage of the disease, when cancer tumor cells invade the bloodstream and migrate to other parts of the body. Increased growth and invasion are traits of more aggressive cancer cells, and develop through various mechanisms. Cells under stress secrete micro-vesicles called exosomes into the extracellular space, and cancer cells secrete large numbers of these. Exosomes that are secreted by cancer cells contain a high number of proteins and microRNA (miRNA), which could be a mechanism of intercellular communication; a mechanism of genetic exchange outside cancer cells that could enhance motility, invasiveness, aggressiveness, and distant cell interaction. The regulation of exosomes has not been fully discovered, but the high protein and miRNA concentration inside the exosome could be a mediated local form of information exchange as it’s been widely reported. One of the proteins found in exosomes is the chaperone protein heat shock protein-90 (Hsp90), which is normally an intracellular protein. Once released via exosomes to the extracellular space, Hsp90 can activate multiple proteins that are known to be involved in tumor metastasis. It is known that after Hsp90 is released via exosomes, it assists in the activation of pro-invasive extracellular proteins such as matrix metalloproteinase-2 (MMP-2), and plasminogen. It is also possible that Hsp90 could activate more
proteins and together help in cancer cell migration and invasiveness.

Based on the fact that Hsp90 is a very concentrated protein inside the exosomes that could enhance motility and invasiveness of cancer cells, we hypothesize that Hsp90 regulates exosome secretion in addition to its association with pro-invasion extracellular proteins. If this is the case, inhibition of Hsp90 could be a means to prevent cancer metastasis by blocking intracellular communication leading to more aggressive tumor phenotypes. To accomplish that Hsp90 regulates exosome secretion, we will correlate Hsp90 activity with the number of exosomes that can be isolated from the extracellular space of breast cancer cell line MDA-MB-231. If the exosome release from cancer cells decreases by inhibiting eHsp90 with drugs, we will know that Hsp90 regulates the exosomal release process. To test this hypothesis, we will isolate exosomes from MDA-MB-231 conditioned media, and examine the exosomes for specific proteins of interest (e.g., Hsp90) by immunoblotting to confirm that Hsp90 and other proteins exit the cell via exosomes. We will also use two types of drugs, and no drugs to the media to see and compare if the exosome release changes. These experiments will lead us to the answer if Hsp90 is important for trafficking of exosomes to other cells.

Faculty Mentor: Dr. Jessica McCready

Effects of Serotonin, Octopamine, and DHEA on Aggressive Behaviors in the Crayfish, Cambarus Bartonii

Anna Gill ’16 and Kaitlyn Riley ’16
Natural Sciences

Various articles report the effect of different neurotransmitters on decapod crustaceans (lobsters and crayfish). For example, research done by Antonsen and Paul, 1997, presented the effects of different hormones on squat lobsters. Some hormones, such as serotonin, have been found to make squat lobsters more aggressive, while others like octopamine made them more submissive. DHEA, a hormone similar to testosterone, has not been tested in invertebrates. Cambarus Bartonii (Appalachian Brook Crayfish) were injected with serotonin, octopamine, or DHEA, and then fought to see how it affected their behavior. Serotonin and DHEA made the crayfish portray more aggressive and dominant behaviors, while octopamine made the crayfish portray more submissive behaviors. Our results confirm that in the crayfish we studied, similar results were found with octopamine and serotonin. DHEA, a steroid hormone also increased aggression, suggesting that these crayfish have a “testosterone-type receptor”, similar to vertebrate-model systems, including humans. Further experiments to determine this “testosterone-type receptor” would be needed but it suggests that this receptor is highly conserved across invertebrates and vertebrates.

Faculty Mentor: Dr. Stuart Cromarty

Effects on Vegetation from Forest Fires at Perkins Farm

Christine McCarthy ’15
Natural Sciences

Possessing environmental consciousness for one's surroundings holds extreme importance, even when residing in a city. The question becomes, can vegetation truly be protected within urban conditions? Perkins Farm is the second largest conservation area in Worcester, Massachusetts and is known for its poor vegetation and dry soil. The dry soil paves way for increased ground fire occurrence. Tree, understory, and soil characteristics were measured to analyze the effects of ground fires on the vegetation by comparing plots visibly exposed to fire with plots that were not. Overall, vegetation and soil characteristics between the two groups of plots measured out similar to one another. Percent shrub cover, however, had an overall lesser value in charred plots compared to not charred. These results indicate that the ground fires damaged the areas exposed superficially, only affecting the understory.

Faculty Mentor: Dr. Owen Sholes
**Examination of ina-1 Mutants in Caenorhabditis Elegans to Better Understand Axonal Patterning**

Priya Ahluwalia ’15, Mary Gonring ’15, & Cassie Lincoln ’15

Natural Sciences

The nervous system is a complex entity comprised of special cells called neurons. Neurons are different than other cells because they have an arm-like projection called an axon. Neurons send signals to other cells along their axons. This communication along axons is vital for numerous functions such as walking, learning and reading. The ability of millions of neurons to properly extend axons to their targets during development is remarkable. The molecular mechanisms that drive this impressive navigational feat are not yet fully understood. Previous studies suggest that a family of proteins, called integrins, play an important role in neuronal motility. In our project, we used the nematode, *Caenorhabditis elegans*, to study axonal patterning. We are trying to better understand how integrins may guide axons to their correct targets. This nematode is an excellent model organism for these studies because it is transparent and we can generate fluorescently tagged axon strains. We can visualize these axons in living animals and study whether integrins are important for axonal patterning. We are conducting experiments to: 1) determine which axons express integrins 2) altering genetics to better understand cell autonomy of ina-1 and 3) co-localization of ina-1.

*Faculty Mentor: Dr. Michele Lemons*

**Free Energy Rate Density and Self-Organization in Complex Systems**

Timothy Bates ’16, Bianca Monaco ’16, & Kayleigh Murphy ’16

Natural Sciences

One of the most important tasks in science is to understand the self-organization’s arrow of time. In our daily lives, it is equally important to observe order increase through self-organization as it is to observe the disorder increase of the entropic arrow of time. To attempt this we utilize the dependence between non-equilibrium thermodynamics and self-organization. Eric Chaisson calculated an exponential increase of Free Energy Rate Density (FERD) in Cosmic Evolution, from the Big Bang until now, paralleling the increase of systems’ structure. We connect FERD to the principle of least action for complex systems. We study CPUs as a specific system in which the organization, the total amount of action and FERD are connected in a positive feedback loop, providing exponential growth of all three and power law relations between them. This is a deep connection, reaching to the first principles of physics: the least action principle and the second law of thermodynamics. We propose size-density and complexity-density rules in addition to the established size-complexity one.

*Faculty Mentor: Dr. Georgi Georgiev*

**Instrumental Analysis of Various Oils**

Lauren Pepi ’15

Natural Sciences

This research examines the difference in makeup of various types of oils. Using NMR, GC/MS, and UV Spectroscopy the compositions of olive oil, canola oil, mineral oil and motor oil were examined and compared. It was determined that olive oil and canola oil, both being vegetable oils have similar NMR spectrums, and mineral oil and motor oil both have similar NMR spectrums. The GC/MS chromatograms show the similarities between canola oil and olive oil, but also outlined their differences. Olive oil was shown to contain steric, oleic and linoleic acid. UV spectroscopy was used to determine the grade of olive oil being tested. The data gathered from this research is being used to determine the composition of a “mystery oil” being secreted from the Audrey Santo memorial statue.

*Faculty Mentor: Dr. Brian Niece*

**Investigating Inhibition of Host Cell Cycle on BK Virus Infection**

Lauren Pepi ’15

Natural Sciences

BK virus is a member of the polyomavirus family and is known to attack and destroy the kidney in 5-10% of human kidney transplant patients. There are 18,000 kidney transplants per year, and currently 93,000
patients waiting for a kidney. Wound healing following kidney transplantation is likely to increase the speed of the cell cycle, the series of steps a cell undergoes to begin as one cell and divide into two. To determine if the kidney cell cycle has an effect on the infection rate of BK virus, Vero cells, a green monkey kidney cell line, were treated with five different cell cycle inhibitor drugs; aphidicolin, monastrol, etoposide, purvalanol and fluorouracil. The kidney cells were treated for 4 hours to synchronize the cells into the various stages of the cell cycle and three important experiments were conducted on these drug treated cells. (1) The cells were treated with the drugs and then tested for cell viability. (2) Following treatment, the cells were challenged with BK virus and then tested to see of the virus successfully entered and infected the cells. (3) To determine if the inhibitor drugs were in fact blocking cell cycle stages, a DNA content/propidium iodide assay was performed. It was determined that aphidicolin and etoposide, which both block early S phase, significantly inhibit BK virus infection levels compared to the control and the other inhibitor drugs. This indicated that S phase might be an important part of the cell cycle that allows the virus to enter kidney cells. The effect of the concentration of these two drugs is currently being examined.

Faculty Mentor: Dr. Aisling Dugan

Isolation and Preliminary Characterization of a Novel Ultraviolet Light Resistant Mutant in the Archaeon Haloferax Volcanii
Madelaine Duarte ’16
Natural Sciences

The Archea comprise an evolutionary domain distinct from the more widely studied Eukarya and Bacteria. *Haloferax Volcanii*, a halophilic archaeon, crowns in high salt environments where it is exposed to sunlight. Ultra violet light (UV) from the sun induces DNA damage, mutations, and can cause cell death. Some examples of responses to UV light include solar protective mechanisms, DNA repair, and damage tolerance. Using a novel screening technique, a UV light resistant mutant, 006R, was isolated. This resistant mutant was found in a strain already mutant for the gene uvrA, which is required for nucleotide excision repair (NER). Therefore, uvrA mutant strains are normally very sensitive to UV light. To investigate the UV resistance of 006R, survival curves were done at varying doses of UV light and polymerase chain reaction (PCR) assays were performed to confirm the uvrA status of all strains. Further analysis of this mutant strain will help us better understand how these unique organisms thrive in their environment.

Faculty Mentor: Dr. David Crowley

Localization of EFHC1 Protein in Tetrahymena Thermophila Axonemes Using Cryo-Et.
Shannon Martin ’15
Natural Sciences

Cilia are important motile and/or sensory organelles present on many cell types, including most human cells at least at some point during development. Defects in assembly and/or function of cilia may result in a group of human diseases, called ciliopathies. The highly conserved core structure of cilia, the axoneme, is composed of a stable 9+2 array of microtubules and more than 400 associated proteins. One of these axonemal proteins is the highly conserved EF-hand domain-containing protein 1 (EFHC1). Mutations of human EFHC1 are linked to the seizure disorder Juvenile Myoclonic Epilepsy (JME). However, the precise location of EFHC1 in cilia, as well as the disease-causing mechanism, are unknown. To determine the location of EFHC1 in cilia, we used cryo-electron tomography and subtomogram averaging to examine knockout mutants of *TtrEFHC1* (*Bbc73*) and its paralog *Bbc60* in the ciliate *Tetrahymena Thermophila*. A comparison with the wild-type axonemal structures suggests structural defects within Microtubule Inner Protein 1 (MIP1) on the inside of the ciliary doublet microtubules in both knockout strains. Microtubule Inner Proteins (MIPs) have only recently been discovered on the inside of axonemal microtubules, basal bodies, and centrioles, but so far, nothing is known about their protein composition or function. Our data suggests that the proteins *TtrEFHC1* and *BBC60* play roles in the formation and/or composition of MIP1 due to the observed structural defects. These results may provide first insight into the composition and function(s) of these newly discovered structures.

Faculty Mentor: Dr. Aisling Dugan
Perceptions and Prevalence of Mindfulness and Meditation among College Students

Sinead Sinnott ‘15
Psychology

The field of Positive Psychology has been rapidly growing in recent years as a means of determining how to most effectively improve the well-being of the general population. One area of this field that has received an exceptional amount of attention is mindfulness and meditation because of its significant physical and mental health benefits. While there is growing evidence that points to the positive effects of meditation and mindfulness on wellbeing and cognitive function, there has been little research to determine the prevalence and perceptions of meditation on college campuses. This study will analyze three main questions: 1) What is the prevalence of, and what are the perceptions and attitudes, of mindfulness and meditation practices among Assumption College students? 2) Among the students who do practice meditation, do these students experience more flow, more positive emotions, and more mindfulness in their daily life? 3) Is there a relationship between academic success and flow, mindfulness, and meditation practices? By analyzing this data I will be able to determine the relationships between meditation and these positive factors, and determine what may be preventing students from practicing.

Faculty Mentor: Dr. Paula Fitzpatrick

NOTES
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Every horizon, upon being reached, reveals another beckoning in the distance. Always I am on the threshold.

W. Eugene Smith

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Program artwork by Ben Gadwah ’15