THE SHOWCASE OF UNDERGRADUATE RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITY AT MARY BALDWIN UNIVERSITY

SENIOR PROJECTS • HONORS PROJECTS • SPECIAL PROJECTS

PARTICIPANTS IN THE CAPSTONE FESTIVAL HAVE BEEN NOMINATED BY THE FACULTY BASED ON THE HIGH QUALITY AND ORIGINALITY OF THEIR WORK AND HAVE ACCEPTED NOMINATION.

#MBUCapstone

MAY 9, 2019

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MARY BALDWIN UNIVERSITY

STAUNTON, VIRGINIA 24401

#MBUCapstone
In the early days of Mary Baldwin Seminary, a Capstone Festival of sorts existed.

“All final examinations were held in public and members of the board of trustees and the townspeople attended to view students parse sentences, do intricate math problems, and recite soliloquies,” wrote Professor Emerita of History Patricia H. Menk in her book To Live in Time: The Sesquicentennial History of Mary Baldwin College 1842–1992.

By the late 1800s, the practice of public recitations had disappeared. In 2006, Mary Baldwin College inaugurated a new Capstone Festival. The 2017 Festival marked the first as Mary Baldwin University.

At each year’s festival, a select group of students, nominated by faculty, present their senior, honors, and special undergraduate research projects to the MBU community and the general public. The high quality and breadth of research, scholarship, and creative activities on display are a testament to the legacy of those earlier years and a celebration of our future.

The 2019 Capstone Festival is made possible through the support of the MBU Advisory Board of Visitors, the Office of Undergraduate Research and High Impact Practices, and the Global Honors Scholars Program.

CONGRATULATIONS
TO ALL STUDENTS PARTICIPATING IN THE 2019 CAPSTONE FESTIVAL

Nomination to the Capstone Festival is in itself a high honor. To recognize extraordinary achievement, top honors will also be given in each presentation section. Panels of three judges will evaluate the creativity, challenge, and execution of the projects as well as the ability of the presenters to communicate the content and significance of their work to a general audience. Top honors awards are accompanied by a cash prize provided through the generous sponsorship support of the MBU Advisory Board of Visitors.

CAPSTONE FESTIVAL 2019 TAKES PLACE WITH SPECIAL THANKS TO:

Members of the Advisory Board of Visitors who helped the participants prepare their presentations, served as judges, and made the Capstone Festival possible by providing generous sponsorship from corporate and community partners:

- Mr. Mike Adams
- Captain Mark Black
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- Ms. Katherine Brennan ’03
- Ms. Janet Brockling ’86
- Ms. Cynthia Burnett
- Mr. Ryan Danraj
- Mr. J. Phillip Dixon
- Dr. Leigh Frame ’06
- Mr. Kevin Hall
- Mr. Chuck Henck
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- Mrs. Liz Hill ’03
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- Mrs. Kathryn Graveley Melo ’81
- Mr. Lyle Moffett, Nominating Committee Chair
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- Mr. Michael Pirron
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- Ms. Lynn P. Sisson
- Mr. Damon Strickland
- Ms. Robin von Seldeneck ’92
- Ms. Hannah R. Vargason ’09
- Ms. Sheryl Wagner
- Ms. Glenda Western ’86

Student volunteers who served as room hosts and panel moderators and assisted with publications and publicity.

Members of the Capstone Coordinating Committee, other faculty and staff, and the extended MBU community who prepared materials and publicity, conducted workshops, helped with setup and logistics, and/or served as judges:

- The entire Hunt Dining Hall staff
- Office of Facilities and Management
- Office of Integrated Communications
- Office of the Provost
- Office of University Advancement
- College of Arts and Sciences Faculty Support Staff

Please take a few moments to help us make next year’s Capstone Festival an even better experience!

Complete the online survey for a chance to win a $25 Downtown Staunton Gift Card.


The Capstone Festival is coordinated through the Office of Undergraduate Research and High Impact Practices. Please contact the Capstone Coordinating Committee at capstone@marybaldwin.edu with questions and/or additional comments and suggestions.
OPENING CEREMONY
HUNT WEST 12:30–12:50 P.M.

Welcome:
Dr. Pamela Fox

Keynote Address:
Life Is a Journey: How Mary Baldwin Prepared Me to Take on the World
Leigh A. Frame ’06 PhD, MHS Program Director, Integrative Medicine
The George Washington University School of Medicine and Health Sciences
Session 1  
CREATIVE WORKS  
1:20–2:35 P.M. • FRANCIS AUDITORIUM


2:50–3:20 P.M. • HUNT GALLERY

Talula Mays, *To Seek Again the Patchwork House.* Project and Academic Advisor: Martha Saunders.

Tanisha Parson, *Drifting II.* Project and Academic Advisor: Martha Saunders.

Session 2  
DELIVERED PAPERS/MULTIMEDIA A  
1:15–2:30 P.M. • MILLER CHAPEL


Maria Torres Trujillo, *The Effect of Daily Activity Level and Body Fat Percentage on Metabolism and Blood Lactate Levels During Exercise.* Project and Academic Advisor: Jennifer A. Hancock.


Session 3  
DELIVERED PAPERS/MULTIMEDIA B  
1:30–3 P.M. • WOODROW WILSON PRESIDENTIAL LIBRARY AND RESEARCH CENTER


Session 4  
DELIVERED PAPERS/MULTIMEDIA C  
3–4:15 P.M. • SPENCER CENTER

Virginia Leigh Daniel, *Queen Mary I of England 1553–1558 CE, Mary’s Marriage: To Her Crown, to Her People, and to Phillip.* Project and Academic Advisors: Mary Hill Cole and Amy Tillerson-Brown.

Mallory Goodine, *Local Hidden History: Uncovering the John East Mound and its Importance to the Churchville and Monacan Communities Through Community Archaeology.* Project and Academic Advisor: Abby Wightman.


**Session 5**
POSTERS A
1:15–2:30 P.M. CLOSED JUDGING SESSION
5–5:45 P.M. PUBLIC SESSION DURING CELEBRATION RECEPTION
HUNT WEST


Varalika Balla, Medicare Part D and Moral Hazard. Project and Academic Advisor: Joseph Johnson.


Tahlaya Hudson, The Effect of Vulva Wash on the Growth of Lactobacillus acidophilus. Project and Academic Advisor: Jennifer A. Hancock.

**Session 6**
POSTERS B
2:45–4:15 P.M. CLOSED JUDGING SESSION
5–5:45 P.M. PUBLIC SESSION DURING CELEBRATION RECEPTION
HUNT WEST


Kelly Li, The Involvement of Lipid Rafts and Caveolae in LL-37/DNA Uptake and Transport. Project and Academic Advisor: Maria Craig.


Jamie Osorio, Growth Inhibition and Cell Death Signaling by Ruta graveolens in Glioblastoma and Cervical Cancer Cell Lines. Project and Academic Advisor: Paul Deeble.


**Session 7**
POSTERS C*
5–5:45 P.M. PUBLIC SESSION DURING CELEBRATION RECEPTION
HUNT WEST

*This session is comprised of students who are unable to attend and will be judged on their posters alone.


**Celebration Reception and Recognition Ceremony**
HUNT WEST • 5–6:15 P.M.

Participants, their families and friends, and community members are invited to view the poster sessions and celebrate students’ achievements at a reception hosted by the Mary Baldwin University Advisory Board of Visitors. Sponsor representatives will present top honors and other special awards at 6 p.m.
Ascharya K. Balaji
Project Advisor: Melissa Scheiber
Academic Advisor: Paul Deeble
Type of Project: Senior Project
Presentation Category: Poster
Title: Examining the Role of Levonorgestrel on the Invasive Behavior of Human T47D Breast Cancer Cells in a Danio rerio Model
Abstract: Breast cancer has the second highest morbidity rate in the world. In the United States alone, approximately one out of eight women will develop invasive breast cancer over the course of her lifetime. Nearly 83% of these invasive breast cancers express the estrogen and/or progesterone hormone receptors. Although numerous studies have been conducted to describe the carcinogenic role of estrogen in breast cancer, the role of progesterin, the synthetic counterpart of progesterone, as a sole carcinogen has not been studied in detail and has been subject to wide debate. We hypothesize that levonorgestrel, commonly known as Plan B, may foster metastatic behavior of tumor microenvironments. To test this hypothesis in vitro, T47D breast cancer cells were treated with levonorgestrel concentrations ranging from 0.1nM to 100 µM for 72 hours. Real-time RT-PCR was conducted to determine the expression of epithelial-to-mesenchymal (EMT)-associated genes, SNAI2 and TWIST, in the presence of levonorgestrel. Results showed that both genes were significantly up-regulated at 72 hours post treatment with 10 µM levonorgestrel (t=6.066, p<0.05; t=5.248, p<0.05). Increased expression of both SNAI2 and TWIST have been shown to correlate with metastasis and poor patient prognosis. To look at the effect of levonorgestrel in vivo, T47D breast cancer cells were labeled with Vybrant® DiO dye and injected into the yolk sac of FLK1:dsRed2 Danio rerio (zebrafish). Future studies will be conducted to delineate the possibility of tumor formation and migration in zebrafish.
Biography: Ascharya Balaji is a biology major with a biomedical science emphasis from New York. She recently presented her research at the Association of Southeastern Biologists conference as a Tri-Beta honors student. Ascharya plans to conduct research at a research institute in the fall of 2019. She is passionate about applying her knowledge to clinically relevant research. In her long term goals, Ascharya plans to matriculate into medical school.

Maddison Bowen
Project and Academic Advisor: Bruce Dorries
Type of Project: Senior Project
Presentation Category: Presentation with multi-media support
Title: Girls in a Boy Scout World: A Communications Audit of an Organization in Transition
Abstract: The Girl Scouts of America (GSA) has been known as the premier leadership development organization for girls in the United States. Recently, the Boy Scouts of America made a landmark decision to allow girls to join. Critics have said that the Girl Scouts don’t offer the same benefits to girls as the Boy Scouts do. How has this affected enrollment in the Girl Scout organization? What are the causes of this shift in interest for girls? Do the Boy Scouts really offer the best programs for girls and boys? This project examines the situation, and how GSA is handling it.
Biography: Maddison Bowen is from Fairmont, West Virginia. She is a marketing communications major, with a double minor in leadership and political science. Maddison is commissioning into the Army Reserves upon graduation, and will attend the Basic Officers Leadership course at Fort Jackson, South Carolina, this summer. She and her fiancé will be moving to Nashville, Tennessee, where Maddison plans to work in communications.

United States Census Bureau, by 2035, the number of people aged 65 and older is expected to be 78.0 million, while the number of children under age 18 is expected 76.4 million. The Bureau also reported that between 2015 and 2060, the number of U.S. residents 65 years and older will increase by 105.2%. As the United States is transitioning into having a large aging population, a majority of this group will receive prescription drug coverage through the Medicare Part D program. The purpose of this project is to examine the effect of more extensive drug coverage in Medicare Part D. The primary question in the project is whether any additional prescription drug coverage will cause satisfaction of formerly unfulfilled needs as well considering if this increase in coverage will cause any and how much of overuse due to moral hazard. In this case, moral hazard is the over-utilization of prescription drugs associated with lower consumer prices that health insurance brings about. Using price elasticity of demand, which is the measure of responsiveness to a price change, in various stages of insurance brings insight into the role of moral hazard in Medicare Part D. Applying the mathematical optimization method of the Lagrange multiplier, we can find the optimal contract, which minimizes cost, in the presence of moral hazard.

Biography: Varalika Balla is a mathematics major with a minor in economics. Her hometown is Fishersville, Virginia. In the fall, she will be entering a master’s program to obtain a dual degree in actuarial science and in qualitative risk analysis and management at Georgia State University.
**Gabriel Cho**  
**Project Advisor:** Lise Keiter and Lynne Mackey  
**Academic Advisor:** Lise Keiter  
**Type of Project:** Senior Project  
**Presentation Category:** Performance or reading  
**Title:** Romantic Characteristics in Chopin’s *Ballade No.1 in G Minor*  

**Abstract:** In the Romantic Era, from 1820 to 1900, many composers broke the rules and boundaries established in the Classical Era. Music during the Romantic Era included more use of minor keys, larger and grander pieces, and more focus on individual expression. Many elements of romanticism can be found in Frederic Chopin’s *Ballade No.1 in G Minor*. Chopin’s *Ballade No.1 in G Minor* was composed between 1831 and 1835, and it is considered to be a piece that displays Chopin’s expertise in writing piano music. With beautiful melodies, contrasting moods, and exciting virtuosity, Chopin’s *Ballade No.1 in G Minor* is a piece that showcases Chopin’s genius as a composer, as well as the characteristics of music at the peak of romanticism.  

**Biography:** Originally from Los Angeles, Gabriel Cho is a senior in the Program for the Exceptionally Gifted. He is majoring in performing arts, with an emphasis in music. His piano teacher is Lynne Mackey. He plans to make a career in electronic music production, as well as performing as a pianist.

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**Rebecca Maeve Custer**  
**Project Advisor:** Calvin Chung  
**Academic Advisor:** Claire Kent  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** The Bolthole Bar Business Plan  

**Abstract:** The Bolthole Bar Business Plan outlines all the information and research involved in setting up a bar — called The Bolthole — in Seattle. It grows out of a unique aesthetic theme that matches the “cyberpunk” genre of media. This startup requires $333,225 for full renovation of a space, assuming worst-case scenario where no equipment preexists in the area. The following business plan outlines the industry research of the bar and nightlife industry in both the United States and Seattle to determine the best ways to renovate the space, stock the bar, and advertise the experience. The Bolthole boasts a variety of signature cocktails that offer customers several choices for unique, thematically-designed beverages. Profits are expected in year two, while a full payoff of the startup costs is expected in the fifth month of year three.  

**Biography:** Rebecca Custer is a business major with a minor in religious studies from Oklahoma City. She is a self-published author of a fantasy novel called *Always Tomorrow*. This summer she will be moving to Novi, Michigan, to pursue a career in the business field.

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**Virginia Leigh Daniel**  
**Project and Academic Advisors:** Mary Hill Cole and Amy Tillerson-Brown  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** Queen Mary I of England 1553–1558 CE, Mary’s Marriage: To Her Crown, to Her People, and to Phillip  

**Abstract:** Queen Mary I of England ruled from 1553 to 1558. During those brief five years, Mary faced the political and religious turmoil of the previous twenty, as well as several challenges to her monarchical authority. Historians usually depict her as a weak-willed woman, subject to the whims of patriarchal figures surrounding her. However, an examination of key points throughout her life, including taking the throne, planning her coronation, and responding to aggressive challenges to her reign, reveal a shrewd politician under the guise of a dutiful Catholic wife. Queen Mary I ruled as the first sovereign Queen Regnant of England, defying a
plethora of influential men in her circle, and succeeded in the establishment, definition, and defense of her status as a sovereign queen.  

**Biography:** Virginia Daniel is a double major in history and political science, with a minor in English. Virginia studied abroad at St. Anne’s College, University of Oxford, which inspired her inquiry into female authority throughout history. Originally from New Kent, Virginia, she will be pursuing a law degree following her graduation from Mary Baldwin University.

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**CAROLINE ELIZABETH FRESCH**  
**Project Advisor:** Paul Callo  
**Academic Advisor:** Paul Deeble  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** Investigating the Origin Status of the Allegheny Crayfish Orconectes obscurus through Mitochondrial Genetic Relationships  
**Abstract:** Despite their regional prevalence, the origin status of the Allegheny crayfish *Orconectes obscurus* is unclear. There are two hypotheses: that the species evolved over time in the region, and that the species originated elsewhere and has been spread rapidly by human interference. If they spread naturally, individuals slowly become less related genetically, while rapid spreading leads to genetically similar populations. In this study, I obtained 12S and 16S mtDNA from 46 crayfish from 8 sites across the Shenandoah Valley in October 2018. However, as the project continued, several changes and amendments to methodology were made. In completion of this project, it is clear that mitochondrial analysis of this species is in need of standardized protocol to ensure reliable results.  
**Biography:** Caroline Fresch is a biology major with a minor in leadership studies. She was also the recipient of the 2018 Advisory Board of Visitors/Capstone Senior Project Fellowship. Coming from Charles Town, West Virginia, Caroline plans on attending Marshall University School of Medicine in Huntington this fall after commissioning as a 2nd Lieutenant in the United States Air Force.

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**ZAAKIRAH FULANI**  
**Project Advisor:** Amy Tillerson Brown  
**Academic Advisor:** Jenna Holt  
**Type of Project:** Senior Project  
**Presentation Category:** Delivered paper  
**Title:** The Invention of Race in Colonial Virginia  
**Abstract:** By exploring the factors that contributed to and actively shaped the creation of race, such as Bacon’s Rebellion, the growing slave trade, slavery itself, colonial laws delineating race, and Western art and images, this paper will argue that the invention of race in colonial Virginia was a relatively novel phenomenon designed to relegate blacks to the lowest class while simultaneously elevating poor whites above them, pit the two groups against one another by disguising their common interests, and ultimately defend capitalism and the economic/political interests of the elite.  
**Biography:** Zaakirah Fulani is a psychology and history double major from Richmond, Virginia. She was accepted into James Madison University’s school psychology MA/EdS program in February and will be attending in the fall of 2020.

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**MALLORY GOODINE**  
**Project and Academic Advisor:** Abby Wightman  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** Local Hidden History: Uncovering the John East Mound and Its Importance to the Churchville and Monacan Communities Through Community Archaeology  
**Abstract:** The newly recognized concept of community archaeology seeks to involve outside help from ancestral community members to create well-informed projects that benefit all parties. But what if the excavation occurred in the past, where there was no accountability or access to ancestral community members? This work seeks to expand the definition of community archaeology through the interviews of community members of the Churchville, Virginia, area and their connection and vested interest in the excavation of the John East Monacan burial mound in Churchville during the summer of 1965. By piecing together information given by these individuals, it is shown that there are stories and artifacts that have inextricably connected both the Monacan and Churchville communities together in ways that show the potential benefits of including non-ancestral communities in piecing together parts of local history.  
**Biography:** Mallory Goodine is an anthropology/sociology major with a minor in religious studies. Her hometown is in Bath, Maine. In the fall, Mallory will be entering a master's program in cultural materials at the University of Sheffield.

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**GABBY HARTLEY**  
**Project and Academic Advisor:** Lise Keiter  
**Type of project:** Senior Project  
**Presentation Category:** Performance or reading  
**Title:** Formal Innovation in Beethoven’s Sonata in E Flat Major, Op. 27, No. 1  
**Abstract:** Ludwig Van Beethoven (1770–1827) was a unique composer in many ways. He is particularly known for experimenting with form. Most Classical Era piano sonatas have three movements, with the first movement in sonata form, a slow second movement, and a fast third movement in rondo form. However, many of Beethoven’s sonatas do not follow the traditional Classical sonata structure. The *Sonata in E Flat Major, Op. 27, No. 1,* written between 1800 and 1801, is especially unique in its form. Beethoven titled this sonata “Sonata Quasi Una Fantasia,” meaning it is a combination of a sonata and a fantasy, which is a free piece that follows few rules. This sonata contrasts from the standard classical structure in various ways. For example, the sonata has four movements instead of three. Also, all of the movements are attacca, meaning each movement moves directly into the next movement, without...
work in overseas missions as a pianist. Gabby Hartley is a music major with an emphasis in piano performance, and she is also completing a minor in psychology. Gabby is from Buckeye, Arizona, and studies piano.

**Biography:** Gabby Hartley is a music major with an emphasis in piano performance, and she is also completing a minor in psychology. Gabby is from Buckeye, Arizona, and studies piano with Lise Keiter at Mary Baldwin. After graduation, she plans to work in overseas missions as a pianist.

**TAHLAYA HUDSON**

**Project and Academic Advisor:** Jennifer A. Hancock  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** The Effect of Vulva Wash on the Growth of Lactobacillus acidophilus

Lactobacillus acidophilus has multiple important roles in human health, including being part of the normal flora of the vagina. Lactobacillus species are lactic acid-producing bacteria that help to maintain the pH level in the vagina at a range of 3.5 to 4.0. This range is optimal for the growth of other normal vaginal bacteria and prevention of conditions such as bacterial vaginosis. Previous work has shown that feminine cleaning agents, such as douches and bubble baths, disrupt the microbiota of the vagina and can lead to bacterial vaginosis. This study will test the effects of three over-the-counter feminine vulva wash products on L. acidophilus growth, since it is important to understand how products marketed for vulva use will affect the normal flora. Serial dilutions of the bacteria will be exposed to 3 different concentrations of the vulva washes after being plated on MRS agar. Control populations will also be created from the same serial dilution. After 24 hours, the number of colonies will be counted on each plate. The numbers of colonies that grow from the exposed bacteria will be compared to the number of colonies that grow on the control plates. It is hypothesized that the vulva cleaning agents will decrease the growth of L. acidophilus.

**Biography:** Tahlaya Hudson is a health sciences major from Miami. She will be applying to the physician assistant program at MBU’s Murphy Deming College of Health Science in their upcoming cycle. Tahlaya presented this thesis at the Association of Southeastern Biologists annual conference last April in Memphis, Tennessee. Tahlaya also founded the first healthcare club on campus, Future Health Care Professions.

**RACHEL JENSEN**

**Project Advisor:** Anne Wick and Kathleen Bell  
**Academic Advisor:** Lise Keiter  
**Type of project:** Senior Project  
**Presentation Category:** Performance or reading  
**Title:** Exploring Literary Conflict through Songs of Desire

**Abstract:** In literature, there are seven main types of conflict: person vs. self, person vs. nature, person vs. person, person vs. society, person vs. machine, person vs. fate/God, and person vs. supernatural. All conflicts start with one desire and an opposing force. That force can be physical, mental, or emotional. In vocal performance, the type of conflict is revealed when the audience is shown a character’s desires and how he/she tries to achieve them. In each of these songs, there is at least one conflict. In “Stizzoso, mio stizzoso” by Pergolesi, the conflicts are person vs. person and person vs. society. In Satie’s “Je te veux,” the conflict is also person vs. person. In “Vanilla Ice Cream” by Bock and Harnick, the conflicts are person vs. self and person vs. person. In Rokicki’s “My Grand Plan,” the conflicts are person vs. supernatural, person vs. person, and person vs. society. While these songs represent different musical styles, each one also shows some kind of conflict.

**Biography:** Rachel Jensen is a music major with emphasis in voice performance and a performing arts major with emphasis in theatre. She is from Friendswood, Texas. Rachel has served as choir librarian, secretary, president, and student director of Bella Voce. After graduation, she is planning to apply to graduate school.

**THERESA DANIELLE JONES**

**Project Advisor:** Paul Callo  
**Academic Advisor:** Paul Deeble  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** Examining Prevalence of Avian Malaria Parasites Based on Nesting Ground Latitude

**Abstract:** Avian malaria is a vector-borne parasitic infection spread by biting flies, midges and mosquitoes. Red-eyed vireos (Vireo olivaceus), a common host of avian malaria, nest in deciduous forests of North America and migrate to the Amazon Basin in South America for the winter. Based on previous work, red-eyed vireos harbor avian malaria parasite lineages, which have shown geographic differences in prevalence; and this may be due to the ecological differences in their breeding grounds. Distribution of vector organisms can be dependent on the biotic and abiotic factors of the nesting forest; therefore I hypothesized that breeding populations of Red-eyed vireos will harbor different avian malaria parasite lineages based on their nesting ground location. To test this, DNA was extracted from 45 blood samples collected from forests in the Shenandoah Valley, coastal Maryland, and Pennsylvania from 2001–05. Nested and real-time PCR reactions were done to analyze those samples, determining infection status and intensity of infection. PCR samples were also sequence analyzed to further determine
identity of parasite lineages. Currently, results have not been retrieved due to multiple steps in troubleshooting regarding extraction techniques and PCR. The objective, however, is to yield samples that show present avian malaria infection. From there, the real-time PCR reaction will give a quantification of the intensity of infection, then sequencing will allow identification of the lineages present within the infected samples. Based on the location from which the blood samples were taken, we can observe whether avian parasite lineages are distributed by geographic location of Red-eyed vireo nesting grounds.

**Biography:** Theresa Jones is a biology major from Atlanta. She has contributed to the Mary Baldwin campus as a leader and mentor through the Office of Inclusive Excellence and Student Government Association, and as a resident advisor. In the fall, Theresa will be entering a PhD program in microbiology at the University of Tennessee in Knoxville.

**SARAH LAWSON**

**Project Advisor:** Lori Wall  
**Academic Advisor:** Stephanie Sebolt  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** Considerations in Sex Education  
**Abstract:** Understanding curricular differences in sex education is important to develop a program that best prepares students to be sexually healthy adults. There are three sex education curricula utilized in public schools: abstinence-only-until-marriage programs, which encourage students to wait until marriage; comprehensive sex education, which aims to provide complete information so students can make informed decisions about sex; and abstinence-based sex education, which is a compromise between the two. A content analysis revealed several flaws contained within each program: a failure to provide complete and accurate information, an exclusion of LGBT+ students, ignoring the role of social structures (such as sexism and racism) and their influence on relationships, and retraumatization of survivors of sexual assault. These issues present a compelling case for revising sex education curricula so they better prepare students for adulthood.

**Biography:** Sarah Lawson is a liberal arts and educational studies major from Lexington, Massachusetts. In the fall, she will be starting a MSEd program in education, culture, and society at the University of Pennsylvania.

**KELLY LI**

**Project and Academic Advisor:** Maria Craig  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** The Involvement of Lipid Rafts and Caveolae in LL-37/DNA Uptake and Transport  
**Abstract:** LL-37 is an important peptide in the human body. One of its functions is that it binds to bacterial DNA to form an LL-37/DNA complex that is transported to monocytes. Cells that have taken up the complexes will detect the DNA to initiate an immune response that targets the bacteria. It has been proposed that LL-37 brings DNA into cells through repeating lipid rafts, which are cholesterol-rich structures in the cellular membrane. To confirm the involvement of lipid rafts, cholesterol-depleting agents methyl-b-cyclodextrin (MCD) and Nystatin were added to deplete the lipid rafts on cell membranes to see if cellular uptake of LL-37/DNA complexes would decrease. Repeat experiments indicate that MCD did in fact decrease LL-37/DNA complex uptake in monocytes. These results are applicable to the creation of specialized medicines to treat the genetic disease cystic fibrosis by using LL-37 to deliver a “corrective” gene for the mutation that causes the disease. Another application could be to use the inhibition of LL-37/DNA uptake to slow down or prevent the onset of certain autoimmune diseases, which arise from LL-37 taking up a person’s own DNA and bringing it to immune cells so the immune response makes the body attack itself. It is evident that further research into the mechanism of LL-37/DNA complex uptake is necessary to improve quality of life for patients.

**Biography:** Kelly Li is double majoring in biochemistry and mathematics. She is from Naperville, Illinois, but recently moved to Roanoke, Virginia. In the future, she plans to do volunteer work at hospitals before pursuing medical school.

**KHARA LILLEY**

**Project and Academic Advisor:** Jennifer Hancock  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media  
**Title:** Causes of the Prevalence and Prognosis Disparities of Type 2 Diabetes in the African American/Black Population  
**Abstract:** There are many health disparities among minority communities in the United States. Men and women within these communities are more prone to certain diseases. One such disease is Type 2 diabetes mellitus. Socioeconomic status greatly contributes to the development of the disease as it greatly influences other risk factors, such as geography and lifestyle choices, which are directly related to the development of Type 2 diabetes mellitus. This project focused on the African American population since they are the most affected by poverty in the United States and, as such, are at a greater disadvantage. A literature review was conducted to analyze the disparities between African Americans and white Americans in respect to risk factors and complications of the disease, as well as the disparities in treatment plans and prognoses. It can be concluded that African Americans are at a higher disadvantage for developing diabetes and its comorbidities due to the lower average socioeconomic status of the population, and how that status affects access to healthy lifestyle choices, healthy living environments, and healthcare.

**Biography:** Khara Lilley is health sciences major. She is from the island of Jamaica. In the spring of 2020, she plans to pursue a master’s degree in healthcare administration.
Yet, with that which they have experienced, filling up the drawers, cabinets, and shelves within the house of the mind, fragments process of curation, one gathers these through an on-going, typically involuntary need not necessarily have division a place in which the remembered and the imagined provides shelter of thought, the furthest interior This space Within the head is a home — impression Within the head is a home — This space the furthest interior provides shelter of thought, a place in which the remembered and the imagined need not necessarily have division Through an on-going, typically involuntary process of curation, one gathers these fragments within the house of the mind, filling up the drawers, cabinets, and shelves with that which they have experienced. Yet, just as a physical house requires care, inhabitation, this internal space will inevitably begin to collapse without one’s occupancy.

This work is the product of my efforts to access the home in my head once more, exploring practical methods designed to encourage its reconstruction as well as the imagery and writing produced through the intuitive extraction and combination of its contents. Biography: Talula Merriwether Mays, from Staunton, Virginia, is a studio art major with a double emphasis in photography and extended media and a minor in film production. In the fall, she will be entering an MFA Studio Art program at JMU with a concentration in sculpture. A collector of the discarded and seemingly useless, Talula’s primary artistic intention is to capture the indescribable depths of that which is commonly unconsidered.

ALEXANDRA MAGDA
Project and Academic Advisor: Paul Deeble
Type of Project: Senior Project
Presentation Category: Poster
Title: The Antibacterial Effects of Hydrolyzed Virgin Coconut Oil on Pseudomonas aeruginosa, Klebsiella pneumonia, and Shigella flexneri
Abstract: New and innovative techniques are currently being examined in order to identify different ways of battling antibiotic-resistant bacteria. One approach is using free fatty acids (FFAs) from hydrolyzed virgin coconut oil as a preventative agent or as supplemental medication. This study evaluates whether the FFAs of saponified virgin coconut oil possess antimicrobial properties. This study was performed by implementing a minimum inhibitory concentration procedure (liquid culture assay) on Shigella flexneri, Pseudomonas aeruginosa, and Klebsiella pneumonia. Hydrolyzed virgin coconut oil exhibited inhibition at the following concentrations: 0.40%, 1.0%, 6.4%, and 16% (v/v) for Shigella flexneri, 2.5% and 16% (v/v) for Pseudomonas aeruginosa, and 0.40% and 2.5-16% (v/v) for Klebsiella pneumonia. This concluded that hydrolyzed virgin coconut oil caused growth inhibition of Shigella flexneri, Pseudomonas aeruginosa, and Klebsiella pneumonia.

Biography: Alexandra Magda is a biology major with a minor in psychology. Her hometown is Sacramento, California. Alexandra was accepted into a program to teach English at a private school in South Korea beginning in the fall of 2019.

KAILEY MORRIS
Project Advisor: Calvin Chung
Academic Advisor: Joe Sprangel
Type of Project: Senior Project
Presentation Category: Presentation with multi-media
Title: Gate Logic Security; A Growing Business
Abstract: In 2012 Gate Logic Security was founded by Shanna Gray. This is a small but rapidly growing business located in Manassas, Virginia. Gate Logic Security is a full-service company that specializes in gates, gate automation and access controls. The automatic gate industry is a fast-growing industry, but it is specific and unique to any general certification or qualification like welding, electricians, electronic engineering, and mechanical engineering. This work examines the company and the industry while suggesting the next steps for the company to take along with areas that need improvement. Hiring those with general qualifications and certifications is a starting point, but offering a specific program to teach and learn the automatic gate industry and ensure a job is the big challenge. The steps for these challenges start with human resources, improving that part of the company will help improve employee quality in the business. The next big step is becoming international through government contracts. The company has contracts to work with embassies and other government facilities in Washington, D.C., but to get to the next competitive level, taking that work to other countries is how Gate Logic Security can expand internationally and differ from similar and local competitors.
**Abstract:** The herb *Ruta graveolens* has been shown to arrest cell growth and cause cell death in various cancer cell lines. This work examines the effect of *R. graveolens* in human cervical carcinoma and mouse glioblastoma cell lines. The entire plant extract was used to treat cells at various concentrations. This study observed the effects of *R. graveolens* in GL261 and HeLa cells at concentrations ranging from 12.5 µg/mL to 50 µg/mL. *R. graveolens* also induced cell death in both cell lines. Anti-cancer drugs kill cancerous cells through cell death signaling pathways such as apoptosis, autophagy, and necrosis. This study confirmed and quantified the cell death signaling pathways such as apoptosis, autophagy, and necrosis. This study observed the effects of *R. graveolens* in GL261 and HeLa cells at concentrations ranging from 12.5 µg/mL to 50 µg/mL. *R. graveolens* has the potential to inhibit cancer cell growth as a therapeutic and warrants further investigation.

**Biography:***Jamie Osorio* is majoring in biology and business with a concentration in sustainability. Her hometown is Arlington, Virginia. She aspires to pursue a career in sustainability/conservation.

**JAMIE OSORIO**  
*Project and Academic Advisor:* Paul Deebel  
*Type of Project:* Senior Project  
*Presentation Category:* Poster  
*Title:* Growth Inhibition and Cell Death Signaling by *Ruta graveolens* in Glioblastoma and Cervical Cancer Cell Lines  

**Abstract:** This paper examines how William Shakespeare depicts Moorish—that is, North African—characters within the works of *Titus Andronicus* (1588) and *Othello: The Moor of Venice* (1603). Through the lens of New Historical and Cultural criticism, the paper will first describe the history of racial representations presented in plays that Shakespeare could have viewed. The paper will next examine how, in *Titus Andronicus*, Shakespeare uses black characters and blackness as a sign for evil, witchcraft, and the devil. Although Shakespeare’s original audiences might expect his next depiction of a Moorish character to continue to play into the tropes of black and white at the time, *Othello*, written roughly 15 years later, subverts these expectations. Even though Shakespeare was comfortable presenting Moorish characters as evil, he writes *Othello* with a Moorish hero. In subverting the tropes, Shakespeare is presenting a play that will make the audience aware of their existing prejudices against Moors and encourage them to see the error of their ways. The driving force of empathy within *Othello* will encourage the audience to be more tolerant of foreigners.  

**Project and Academic Advisor:** Edward Scott  
*Type of Project:* Senior Project  
*Title:* Anselm in Seeking God and Regarding the Fools  

**Abstract:** An early medieval Christian philosopher, Anselm of Canterbury employed a mix of reason and religion to rationalize the world around him. In examining the world, he found that God must exist due to the fact that God is ‘something-than-which-greater-cannot-be-thought’. Anselm’s theory on the existence of God was later deemed illogical by both contemporary and modern philosophers alike. However, Anselm’s writings remain a useful reminder that the power of belief can help humanity overcome the crushing existential crisis of simply existing.  

**Biography:** Faith Parker is an English major with a minor in philosophy. Her hometown is Virginia Beach, Virginia. In the fall, Faith will be completing her Master of Arts in Teaching. Afterwards, she will go on to law school.

**FAITH PARKER**  
*Project Advisor:* Sarah Kennedy  
*Academic Advisor:* Katherine Turner  
*Type of Project:* Senior Project  
*Presentation Category:* Poster  
*Title:* Intolerant Shadows: Black and White in *Titus Andronicus and Othello*  

**Abstract:** This paper examines how William Shakespeare depicts Moorish—that is, North African—characters within the works of *Titus Andronicus* (1588) and *Othello: The Moor of Venice* (1603). Through the lens of New Historical and Cultural criticism, the paper will first describe the history of racial representations presented in plays that Shakespeare could have viewed. The paper will next examine how, in *Titus Andronicus*, Shakespeare uses black characters and blackness as a sign for evil, witchcraft, and the devil. Although Shakespeare’s original audiences might expect his next depiction of a Moorish character to continue to play into the tropes of black and white at the time, *Othello*, written roughly 15 years later, subverts these expectations. Even though Shakespeare was comfortable presenting Moorish characters as evil, he writes *Othello* with a Moorish hero. In subverting the tropes, Shakespeare is presenting a play that will make the audience aware of their existing prejudices against Moors and encourage them to see the error of their ways. The driving force of empathy within *Othello* will encourage the audience to be more tolerant of foreigners.

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**Biography:** Faith Parker is an English major with a minor in philosophy. Her hometown is Virginia Beach, Virginia. In the fall, Faith will be completing her Master of Arts in Teaching. Afterwards, she will go on to law school.

**TANISHA PARSON**  
*Project and Academic Advisor:* Martha Saunders  
*Type of Project:* Senior Project  
*Presentation Category:* Visual or audio-visual creation  
*Title:* Drifting II  

**Abstract:** The core of my work focuses on gender, race, sexuality, and social norms. The works explores gender fluidly, duality, and self-awareness in and out of the black community. Portraiture and Graphic Novels are genres used to create narratives that describe ways people grapple with self-awareness, acceptance, and loving oneself. I use portraits to document shifts in person’s identity. Using the singularity of a figure and multiple symbols, I am interested in the idea of how people perceive “others.” The Zen Buddhist principle states “perceived identities are not one’s true self; something that must be stripped away to reach one’s true self.” Parts of my work are pure line description, or underdrawing, to illustrate this idea of the true self, although not stripped entirely away because it’s a natural occurrence in people to want to identify with a group.  

The main mediums I work with are watercolor and gouache. The translucency property and its fluidity creates many layers just like personality. Watercolor is water soluble medium, which connects with my use of water as an important image.  

**Biography:** Tanisha Parson is a Studio Art major with an emphasis in painting and drawing. They also have a minor in Asian studies. Their hometown is Surry County, VA. Tanisha’s future plans include teaching in Japan and having an entrepreneurship.
**TASHA PULLAM**

**Project Advisor:** Mary Hill Cole and Amy Tillerson-Brown  
**Academic Advisor:** Mary Jane Epps  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media  
**Title:** The Evolution of Gay Rights in the late 1960’s and early 1970’s: the Mattachine Society, Gay Liberation Front, and the Gay Activists Alliance

**Abstract:** In the late 1960’s and early 1970’s, gay rights groups came to national prominence with the Stonewall Riots. Although gay rights groups including the Mattachine Society had existed before the 1960’s, the Stonewall Riots spawned a new generation of activism, splitting older homophile groups along lines of philosophy. This split caused the breakdown of the Mattachine Society as it evolved into newer organizations more suited to the new needs and possibilities of the era. Through the splitting of the Mattachine Society and the evolution of new groups like the GAA and GLF, momentous changes were able to occur in the following decades.  

**Project and Academic Advisor:** Mary Jane Epps  
**Type of Project:** Senior Project  
**Title:** Effects of Temperature on the Infection Rate and Mortality of *Reticulitermes flavipes* in Eastern Subterranean Termites (Rhinotermidae)  

**Abstract:** Termites (Isoptera) play a critical ecological role in the carbon cycle through wood breakdown, but also have economic costs from their tendency to eat crops and human structures. Termite populations are regulated both naturally and commercially by a range of fungal entomopathogens, including the widespread *Beauveria bassiana*. However, the effect that climate change will have on termite-pathogen interactions is unclear. *Reticulitermes flavipes*, also known as the Eastern Subterranean Termite, is the most common species of termite in the Eastern U.S. and is susceptible to infections by *Beauveria*. This study examines the effect of temperature on the infection rate and mortality of *B. bassiana* in *R. flavipes*. Four incubators, set from 23-35°C, each held five *R. flavipes* colonies that were exposed to *B. bassiana* and monitored for death by the fungus. Through this study, I found that *B. bassiana*-induced mortality increased with temperature, which could have serious implications for economic and ecological wood breakdown as climate change continues.  

**Biography:** Tasha Pullam is a history and biology major, with minors in criminal justice, religious studies, and anthropology. She is from Lizton, Indiana. In the fall, she will be entering a master’s program for Library Science at Indiana University Bloomington.

**DESJOURNE REID**

**Project Advisor:** Calvin Chung  
**Academic Advisor:** Janet Ewing  
**Type of Project:** Senior Project  
**Presentation Category:** Presentation with multi-media support  
**Title:** Overcoming Corporate Financial Fraud

**Abstract:** Corporate financial fraud caused the collapse of four prominent accounting firms, leaving the Big Four accounting firms to manage the auditing industry: Deloitte, PricewaterhouseCoopers, Ernst & Young, and Klynveld Peat Marwick Goerdeler. It remains a concern for businesses globally. The blatant lack of transparency, accountability, and consideration caused a significant decrease in public and consumer trust. It has also prompted the establishment of the Sarbanes-Oxley Act and a change to accounting curricula to include Fraud and Forensic Accounting education. Qualitative analysis of the audit quality mechanisms utilized by the Big Four coupled with the establishment of the Sarbanes-Oxley Act has shown the immeasurable increase in audit quality since the early 2000s. The results indicate that the Big Four have found ways to improve audit quality through the creation of auditing platforms and visualizations tools that reduce employee workloads, making them more efficient and objective, and also reduced the number of restatements. Each of the Big Four firms has trained employees to make the audit procedure as digital as possible and improved client satisfaction ratings due to lack of error. The trailblazing accomplishments of the Big Four sets the standard in the finance industry to make the auditing processes more objective, equitable, efficient, and transparent. These policies and procedures can serve as benchmarks for other accounting and auditing firms in the future.  

**Biography:** Desjorne is an accounting major from Jersey City, NJ. She has been a tutor in accounting since her sophomore year. She has begun courses for the MBA and has plans to continue the program immediately after graduation.

**EMMA RHODENIZER**

**Project and Academic Advisor:** Maria Craig  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** Uptake of DNA: LL-37 Complexes  
**Sequences by THP-1 Cells**

**Abstract:** LL-37 is an immune system protein in the class of cathelicidin peptides that has beneficial roles as an antimicrobial and pathogen-sensing molecule. Altered levels of LL-37 have been linked to a growing number of diseases, including autoimmune diseases, cancer, cystic fibrosis, and asthma. LL-37 binds to bacterial and self-DNA, forming complexes that are internalized by many immune cell types, and formation of these complexes both protects DNA from degradation and increases internalization of LL-37. LL-37 and self-DNA uptake appears to be a pathway by which the
immune system may recognize and respond to self-DNA in certain autoimmune diseases, and LL-37-bound DNA is taken into cellular compartments that contain DNA-recognition receptors for the immune system known as toll-like receptors (TLR). In order to examine this pathway, we used fluorescence microscopy to observe the uptake of fluorescently-tagged LL-37 into model immune cells (the THP-1 monocytic cell line) in the absence and presence of short double-stranded DNA fragments. In particular, we investigated sequence effects and observed that LL-37 forms complexes with a variety of DNA sequences, including the CpG sequences known to activate TLRs. CpG and Poly-A sequences effectively enhanced LL-37 uptake into cells, while GpC and Poly-G were less effective. The mechanism for LL-37/DNA uptake is an interesting area of study that may reveal ways to facilitate LL-37-mediated immune responses and help to create more specialized medicines.

Biography: Emma Rhodenizer is a biochemistry major with a minor in physics. She is from Waynesboro, Virginia, and has done research projects in psychology, physics, and biochemistry during her time at Mary Baldwin. Emma will be entering an M.D. program at VCU School of Medicine after graduation.

Conscious Potentials

Abstract: Music acts as a form of communication between the musician and the listener. The musician initiates a conversation that holds the power to create a relationship with the listener, express an argument against social norms or laws, or convey a sense of community with and between the musician and all of the listeners. Rap, pop, and hip-hop originally challenged social norms in their lyrics. Through the standardization of these genres by the industry and by producing a sameness within the songs, two clear categories emerge: commercial and conscious. Commercial rap, pop, and hip-hop lyrics songs are pre-structured by the industry to be successful among their consumers and often present drug use and production, unhealthy sexual relationships, and violence as the models of success for minority communities. In contrast, conscious songs are more focused on the marginalization of minority groups and call for drastic social change and attention to situations that often remain unspoken in society. This essay looks at the extent to which and how this drive for standardization conflicts with the potential for musicians to use their social capital to try to shape or reshape social norms, expectations, trust, and informal social control. Data collected on songs nominated multiple times by the major award shows in the U.S. was analyzed to determine how many commercial and conscious lyrics each song has to determine how popular commercial music is compared to conscious music in the U.S. The data analysis shows that only four of the thirty-one songs analyzed have any conscious lyrics in them, each having less than 12 percent of their lyrics containing conscious messages. Songs with over 50 percent of conscious lyrics are discussed in comparison to those in the data collection. This comparison allows for an understanding that conscious songs are available to listeners but do not fit into this essay’s definition of popular music in the U.S.

Biography: Shaina Elizabeth Riddle is a sociology and theatre double major from Ludowici, Georgia. She aspires to get her master’s degree in business and PhD in sociology. Her goal is to study economic, family, and gender differences between different countries around the world, as well as race, gender, and class inequalities in the United States.

WILLIAM RINALDO
Project Advisor: Amy Diduch
Academic Advisor: Marina Omar
Type of Project: Senior Project
Presentation Category: Presentation with multi-media support
Title: Environmental Degradation and Trade

Abstract: This presentation will contribute to the debate in which environmentalists, economists, and industry representatives continue to disagree over the effect of trade on the environment. Political economy theory states that politics and economics are intertwined. Utilizing the Environmental Kuznets Curve (EKC) and the Perception of Corruptibility Index, Rinaldo will address the the concept that institutional distance (the idea that nations trade with nations similar to their own) has an effect on trade. The issue of institutional distance has created a gap in developed and non-developed nations working together to improve the global commons. Research indicates that corrupt nations are more likely to trade with corrupt nations (and non-corrupt with non-corrupt), and this applies to environmental regulations cross-country as well.

Biography: William Rinaldo is an international affairs major with a minor in anthropology and is a member of Pi Sigma Alpha, Omicron Delta Epsilon, and Phi Beta Kappa. He served in the United States Marine Corps as a meteorology/oceanography analyst and was honorably discharged as a sergeant in 2015. He plans to continue his work in global affairs and environmental sustainability in the future.

ELIZABETH SHATZER
Project Advisor: Donovan Branch
Academic Advisor: William Rinaldo
Type of Project: Senior Project
Presentation Category: Presentation with multi-media support
Title: The Impact of Immigration Policy and Political Climate on Undocumented Latino Immigrant Health and Health Care Seeking

Abstract: While immigration has long been contentious in the US, immigration policy has been at the center of escalating tensions and controversy since the beginning of the 45th administration. The purpose of this research is to identify how current immigration policy and the evolving political climate are impacting undocumented Latino immigrant health and health seeking. It is also concerned with how healthcare professionals are responding to this matter. The research method for this project is a content analysis, using a cluster sampling drawn from Kaiser Health News, Modern Healthcare, and Health Care 360.
Affairs Blog from January 2017 to present. The analysis indicates that undocumented Latino health and health seeking behavior is being adversely affected by policy and politics, and professional publications are covering the topic at an increasing rate. Continued research will be needed as the ramifications of policy and political climate continue to develop.

Biography: Elizabeth Shatzer is a health care administration major from Staunton, Virginia. She currently works for Augusta Health and plans to continue to grow her healthcare career. Elizabeth will be attending Murphy Deming College of Health Sciences in the fall for a master’s in healthcare administration.

SARAH SHEEHAN
Project and Academic Advisor: Paul Callo
Type of Project: Senior Project
Presentation Category: Poster
Title: Testing for the Presence of Batrachochytrium dendrobatidis in an Amphibian Biodiversity Hotspot

Abstract: One of the leading causes of amphibian declines all over the world is Batrachochytrium dendrobatidis (Bd), a species of chytrid fungus that is transmitted through contact with infected water and contact with an infected individual. Bd infection has been detected throughout the southeastern United States, including at Maple Flats Ponds in the Appalachian Mountains, an amphibian biodiversity hotspot. Maple Flats was considered free of Bd infection until 2014 when its DNA was detected in one of the ponds. This study aims to test whether the infection has spread to the amphibian population. As a positive control, pure Bd cultures were swabbed and the DNA extracted using four different extraction techniques. None of the techniques were able to extract high enough yields from swabs to be detectable through PCR. Twenty-seven amphibian samples taken from Maple Flats were extracted using the better of the four techniques, 5% Chelex, and were then run through PCR with Bd-specific primers. The samples produced no evidence of Bd presence at Maple Flats, but the results may be false negatives due to the ineffectiveness of the extraction technique and the inability to detect the positive control with PCR. Swabs are the most common method for detecting Bd DNA in the field. However, extraction methods used are either inadequately explained or are not easily reproducible. A method that is both accurate and cost-effective is needed for studies of this nature to be replicated by more labs concerned about the status of local amphibian populations.

Biography: Sarah Sheehan is a biology major and criminal justice minor from Midlothian, Virginia. She plans to gain work experience in the field of conservation before attending graduate school. Sarah’s passions include elephants, hiking, and everything Harry Potter.

MARIA TORRES TRUJILLO
Project and Academic Advisor: Jennifer A. Hancock
Type of Project: Senior Project
Presentation Category: Presentation with multi-media support
Title: The effect of daily activity level and body fat percentage on metabolism and blood lactate levels during exercise

Abstract: Exercise increases heart rate, lactic acid production, and energy expenditure. Oxygen consumption (VO₂) and carbon dioxide production (VCO₂) increase as a result of the increase in energy use. This work examined how daily activity level and body fat percentage affect blood lactate levels before and after exercise. First, participants completed a survey to determine their daily activity level. Next, their neck and abdomen circumference and height were measured and used to estimate their body fat percentage. Blood lactate levels were also measured in individuals before and after exercising on stationary bike for 20 minutes. The resistance of the bike was increased every five minutes. During exercise, a metabolic cart was used to capture VO₂ and VCO₂ measurements. The change in lactate level was correlated with body fat percentage, VO₂ and VCO₂, as well as being compared between groups based on daily activity level.

Biography: Maria Torres-Trujillo is a health science major from Catawba, North Carolina. She has been an enlisted service member in the United States Army Reserves throughout her college career and will be commissioning as a U.S. Army Medical Service Corps officer upon graduation.

MIRGINA VALEMBRUN
Project Advisor: Sarah Kennedy
Academic Advisor: Susan Schmeissing
Type of Project: Senior Project
Presentation Category: Delivered paper
Title: Eden’s Gendered Politics

Abstract: Paradise Lost has established itself as a central text in the Western literary canon in part because of its polarizing political, social, and religious depiction of gender inequality and the role of the female. Perhaps the most controversial aspect of the poem is the characterization of Eve, who reflects Milton’s religious and social beliefs about women. This paper will analyze Paradise Lost from a feminist perspective, tracing the individualism of Eve and her interactions with the male characters in the poem. I will also examine the role of gender in Milton’s paradise. Not only does Milton’s characterization of Eve reinforce patriarchal ideology, but the poem’s ethical framework justifies and perpetuates male dominion over women.

Biography: Mirgina Valembrun is an English major with a minor in sociology. She is a Haitian American from Brooklyn, New York. She served in the United States Army as a paralegal specialist and will attend law school in the fall of 2019. Mirgina aspires to be a human rights attorney.
CAPSTONE NOMINEES UNABLE TO ATTEND

The following students were nominated for the Capstone Festival but are unable to attend because they are either on a study abroad program during May Term or participating in another off-campus program. We include their information here in recognition of their achievements.

*These students are unable to attend the Capstone Festival but have chosen to participate by submitting posters detailing their projects. Students will be judged on their posters alone. Posters are listed under Session 7: Posters C.

JANELL CHAVIS*
Project Advisor: Lori Wall
Academic Advisor: Stephanie Sebolt
Type of Project: Senior Project
Presentation Category: Poster
Title: Describing Social and Political Events in Virginia Linked to Desegregation and the

Individuals Involved

Abstract: SOL VS.9 c,d states that the student will demonstrate an understanding of Virginia during the twentieth century and beyond by (c) describing the social and political events in Virginia linked to desegregation and Massive Resistance and their relationship to national history; and (d) describing the political, social, or economic impact made by Maggie L. Walker; Harry F. Byrd Sr; Oliver W. Hill Sr; Arthur R. Ashe Jr; A. Linwood Holton Jr; and L. Douglas Wilder. This standard is the focus of the unit plan JaNell created as part of her senior thesis, and is the content included in all ten of the lesson plans included within the unit. African American teachers are considered a scarce resource in the field of education. The research portion of JaNell’s project discusses why the need for African American teachers is crucial in modern day classrooms, as well as how school systems can go about ensuring their faculty and staff is diverse and accurately represents the world their students will be entering in terms of race. Two solutions that were gathered from the research were administrators believing that racial representation amongst their faculty/staff was important, and reformatting teacher education programs to pursue individuals who understand that teachers should be in it for the outcome instead of the income.

Biography: JaNell Chavis is a Liberal Arts in Educational Studies major with a double minor in History and Spanish Language and Hispanic Culture from Richmond, Virginia. Over her three years at MBU, JaNell has been actively involved on campus and within the Office of Inclusive Excellence. Although JaNell will be returning to MBU in the fall to complete the M.A.T. program in Elementary Education PK-6, her ultimate goal is to become an ESL teacher

ELIZA HONG
Project and Academic Advisor: Dan Stuhlsatz
Type of Project: Senior Project
Title: The Christian Identity in Nonviolent Mass Protest: In the Words of Dr. Martin Luther King Jr.

Abstract: The black church became a resource on both macro and micro levels during the civil rights movement. As a macro resource, the church provided an existing organizational structure and charismatic leadership through clergymen. The black church also provided three micro resources: a common culture, motivation, and group consciousness. The church drew on a tradition of black protest activity to create an altered Christian narrative encouraging active protest. Black church macro resources have been analyzed with social movements theory frameworks called resource mobilization and political process. However, literature on the micro dimension is lacking, especially through nonviolent direct action theory. Rev. Dr. Martin Luther King Jr was the public figurehead to nonviolent direct action theory. He was a liaison to the masses through the Southern Christian Leadership Conference, the decentralized network driving the black church. The narrative of Christianity specifically galvanized mass mobilization. However, according to my research no analysis of King’s speeches towards the masses has investigated the relationships between Christianity, moral values, and encouraging movement activity in his language. This thesis uses content analysis of speeches by King in mass meetings and rallies to examine the relationships between the variables of religious terms, value terms, and terms encouraging nonviolent resistance action. According to nonviolent direct action theory, the moral and religious ties to movement activity operates as a strategy. The micro resources generated from such relations would be fundamental for the Civil Rights Movement.

Biography: Eliza Hong created an interdisciplinary major in nonviolent social movements combining sociology, philosophy, and religious studies. She came to MBU as a PEG from Blacksburg, Virginia, and hopes to work internationally in a nongovernmental organization or public service.

ALEXIS LAZO*
Project Advisor: Mary Jane Epps
Academic Advisor: Paul Deeble
Type of Project: Senior Project
Presentation Category: Poster
Title: A Comparison of Moss-Associated Microfauna in Dicranum scoparium and Ptilium crista-castrensis

Abstract: Mosses (Bryophyta) are an ubiquitous component of terrestrial biomes, where they form an important contributor to net primary productivity and play key roles in carbon and nitrogen cycling. Mosses also provide habitat for a diversity of microinvertebrates such that they create their own micro-ecosystems. Moss microfauna aid in nutrient cycling, and

Across an Elevational Gradient in Western Virginia

Individuals Involved

Abstract: SOL VS.9 c,d states that the student will demonstrate an understanding of Virginia during the twentieth century and beyond by (c) describing the social and political events in Virginia linked to desegregation and Massive Resistance and their relationship to national history; and (d) describing the political, social, or economic impact made by Maggie L. Walker; Harry F. Byrd Sr; Oliver W. Hill Sr; Arthur R. Ashe Jr; A. Linwood Holton Jr; and L. Douglas Wilder. This standard is the focus of the unit plan I created as part of my senior thesis, and is the content included in all ten of the lesson plans included within the unit. African American teachers are considered a scarce resource in the field of education. The research portion of JaNell’s project discusses why the need for African American teachers is crucial in modern day classrooms, as well as how school systems can go about ensuring their faculty and staff is diverse and accurately represents the world their students will be entering in terms of race. Two solutions that were gathered from the research were administrators believing that racial representation amongst their faculty/staff was important, and reformatting teacher education programs to pursue individuals who understand that teachers should be in it for the outcome instead of the income.

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Project Advisor: Mary Jane Epps
Academic Advisor: Paul Deeble
Type of Project: Senior Project
Presentation Category: Poster
Title: A Comparison of Moss-Associated Microfauna in Dicranum scoparium and Ptilium crista-castrensis

Abstract: Mosses (Bryophyta) are an ubiquitous component of terrestrial biomes, where they form an important contributor to net primary productivity and play key roles in carbon and nitrogen cycling. Mosses also provide habitat for a diversity of microinvertebrates such that they create their own micro-ecosystems. Moss microfauna aid in nutrient cycling, and

Across an Elevational Gradient in Western Virginia
previous studies suggest that microfaunal communities could be used in environmental monitoring as effective indicators of ecosystem health. Changes in elevation cause climatic changes that affect bryophytic phenotypes and can variously influence selective pressures on microfaunal communities. However, how these microfaunal communities vary with elevation remains unclear. In this study, elevation, surface leaf area, and water content are tested as potential drivers for abundance and biodiversity of microinvertebrates. In addition, the relationship of water content, surface leaf area, microfaunal abundance and biodiversity between species of moss is examined. Microinvertebrate communities were characterized in 39 collections of *Dicranum scoparium* (18 samples) and *Ptilium crista-castrensis* (21 samples) across an elevational gradient (632-1134 m a.s.l.) on the Great North Mountain in Augusta Co., Virginia. Abundance and diversity of microfauna were compared as a function of elevation and moss functional traits, including water content and surface leaf area. This research offers insight into the factors that shape microfaunal communities of mosses, a rich but relatively unstudied component of terrestrial biodiversity. 

**Biography:** Alexis Lazo is biology major with an emphasis in biomedical science and a minor in anthropology. Her hometown is Miami, Florida. During her time at Mary Baldwin, she has served as a residential advisor and the treasurer of Baldwin Program Board. This May, she will be in Spain hiking the El Camino with other Mary Baldwin students.

**QADIRA MUHAMMAD**

**Project Advisor:** Laura van Assendelft and Amy Diduch  
**Academic Advisor:** Marina Omar  
**Type of Project:** Senior Project  
**Title:** La Francophonie: How France’s Culture Diffusion Impacts Its Aid Allocations in Africa

**Abstract:** Foreign aid in Africa is often not allocated on a purely humanitarian basis according to the current literature. One clear pattern of allocation is guided by former colonial ties. France especially conforms to this tendency. However, favoritism in foreign aid allocation has not been explicitly addressed in publications so far, despite strong evidence suggesting that former colonial ties are a major determinant of foreign aid allocation. In my research, I address this gap by using quantitative and qualitative data to examine France’s foreign aid policies in Africa. The results indicate that colonial ties are strongly correlated with France’s foreign aid allocation policies. I argue that *la francophonie*, the foreign policy of spreading French culture and language, is a determinant of France’s aid choices. 

**Biography:** Qadira Muhammad is a political science major and religious studies minor from Richmond, Virginia. Her passion for sustainable development has driven her to intern as a NewGen Peacebuilder and as a United Nations youth representative for the International Youth Leadership Institute. Upon graduation, she intends to intern for an internationally-focused political organization.

**MARY OLIVER**

**Project Advisor:** Melissa Scheiber  
**Academic Advisor:** Paul Callo  
**Type of Project:** Senior Project  
**Presentation Category:** Poster  
**Title:** The Effect of Micro-RNA 200a Targeting PTEN to Inhibit Apoptosis in THP-1 Cells Following a Lipopolysaccharide-Induced Immune Response

**Abstract:** The phosphatase and tensin homolog gene (PTEN) responsible for regulation of the cell cycle, monitoring migration, proliferation, and signaling apoptosis in cells is triggered in the immune response when our body faces an invading pathogen. Monocytes offer primary protection against pathogens in the immune system. However, when monocytes become damaged, the following dysfunction can lead to an array of immune disorders and cancers. Currently, the impairment of this physiological system remains largely unclear. In this study, lipopolysaccharide (LPS) was used to induce an immune response in THP-1 monocytes by prolonged short term (24 hrs) and long term (120 hrs) exposure. The growth of cells, measured through Trypan Blue exclusion testing, was unsuppressed at low dosages (0-10µg/ml) LPS, but was significantly decreased when compared to the control in higher dosages (15-20µg/ml) 120 hours post treatment (p-value <0.05 as shown by ANOVA). Dendritic and macrophage characteristic development was visualized by inverted microscopy. In previous studies, miRNA-200a has been shown to be an oncogene in a variety of cancers promoting tumorigenesis by negatively regulating PTEN. Using Real-Time RT-PCR, we demonstrated a significant down-regulation of miR-200a at 120 hours post LPS treatment at 15µg/ml-20µg/ml (t =4.262, p<0.05; t=3.905, p<0.05). The kinetics of this endotoxin response remains to be further investigated by analyzing PTEN protein expression through a Western Blot. Findings discovered in this study will point to another mechanism of endotoxin tolerance and control in monocytic cells. Results can lead to furthering our understanding of monocyte dysfunctions in immune disorders. 

**Biography:** Mary Oliver is a biology major with an emphasis in biomedical science and a music minor from Springfield, Virginia. During her year before matriculating to graduate school, she will be working as a research assistant at the University of Virginia or Georgetown University.
DIANNA TRAN
Project and Academic Advisor: Amy McCormick Diduch & Dr. Laura Van Assendelft
Type of Project: Senior Project
Title: Examination of the Electricity Approach as a Measure of the Shadow Economy

Abstract: Economic activity not recorded in GDP, often referred to as the informal or “shadow” economy, could potentially have profound impacts on a nation’s overall economy. One of the most prominent obstacles to studying the informal economy has been the difficulty of measuring the shadow economy, as there is no consensus among economists regarding which measure of the informal economy is most reliable. The official IMF measures of the informal economy do not sufficiently capture the informal economy because the model makes assumptions that contradict basic macroeconomic theory. Therefore, I examined the extent to which an alternative electricity measure of the shadow economy or the Electricity Consumption Method (ECM) could hold up to official IMF estimates by calculating the electricity consumption growth of Singapore, Malaysia, Thailand, Philippines, Vietnam, Indonesia, and Myanmar as a proxy for overall economic growth, then subtracted each country’s GDP growth in order to derive an estimate of informal growth. To observe the extent to which electricity consumption represented economic activity for each nation, I calculated the electricity to GDP elasticity of each observed nation. The results of this examination conclude that the electricity measure is mostly unreliable unless the observed country has an electricity to GDP elasticity of one.

Biography: Dianna Tran is a political science and economics double-major with a minor in peacebuilding and conflict resolution who currently resides in Manassas, Virginia. She has worked as the co-president of the Keep it Clean peace project, a community peace-building initiative under the guidance of Dr. Owen. She will return to Vietnam in the winter of 2019.

SAGE WYATT*
Project Advisor: Melissa Scheiber
Academic Advisor: Paul Deeble
Type of Project: Senior Project
Presentation Category: Poster
Title: Characterization of the effects of testosterone propionate on gene expression and skeletal development in zebrafish

Abstract: Testosterone has been identified as a very important regulatory hormone for bone development at all stages of life. In humans, high testosterone levels are correlated to detrimental skeletal disorders such as scoliosis and cleft palate. If there is a causative relationship between testosterone propionate and scoliosis development, it is important to characterize the phenotype and its genetic basis. In this study, we performed morphological studies on the effect of testosterone in early development using a zebrafish model organism. We exposed zebrafish embryos to a 1% concentration of a testosterone propionate saturated in absolute ethanol at the 200 cell stage. Treated embryos exhibited significant spinal curvature and snout stuntedness. The average angle of spine curvature was 70.4°± 25.7°. *p<0.01, (n=8). The average testosterone vehicle snout length ratio was 0.7 ± 0.1 : 1. *p<0.01, (n=8). These traits corresponded to the overexpression of PTCH1 and LBX1, genes associated with cleft palate and scoliosis respectively in humans. This effect suggests an equivalency to human disease, where testosterone may play a crucial role in the development of skeletal deformities.

Project Advisor: Allan Moye
Type of Project: Special Project
Title: Out comes

Abstract: Every child yearns for the acceptance of a parent, but sometimes this process of bridging generational gaps, life experiences, and identity can be extremely difficult. “Out comes” explores a common journey of seeking love when expecting the worst.

Biography: Sage Wyatt is a biology major with a biomedical emphasis from Dothan, Alabama. In addition to serving as president of Beta Beta Beta, she was also the recipient of the 2013 Advisory Board of Visitors/Capstone Senior Project Fellowship and has been involved in establishing the Baldwin Undergraduate Research Network. After graduation, she will be attending a global health masters program from Duke University in Kunshan, China.

KEIONESHEA WEST
Project Advisor: Donovan Branche
Academic Advisor: Dianna Parish
Type of Project: Senior Project
Title: Creating a Welcoming Clinical Environment for LGBT

Abstract: The United States has been active in creating a welcoming clinical environment for LGBT since the Affordable Care Act in 2010 and the Institute of Medicine 2011 report focusing on the access and quality of care for LGBT patients via cultural competence. Since the release of the statement, three organizations have created guidelines for healthcare organizations on how to become an open door, open heart, and open mind healthcare organization. This work examines the use of the three guidelines created by the Joint Commission, Gay and Lesbian Medical Association, and Fenway Institute. Results indicate cultural competency is necessary to create a welcoming clinical environment.

Biography: Keioneshea West is a healthcare administration major from Roanoke, Virginia. This fall, she will be entering a master’s program in health care administration at Jefferson College of Health Sciences at Carilion Clinic in the Roanoke Valley.
Since opening its doors in 1994, Augusta Health, an independent and community-owned health system, has focused on bringing high quality healthcare close to home while fulfilling its mission “to improve the health and well-being of our community through access to excellent care.”

Key services provided by Augusta Health to the community include:

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- A Heart & Vascular Center that provides high quality diagnostic and therapeutic care—angioplasty and stenting, a Cardiac Catheterization Lab, cardiac stress testing, non-invasive testing, an Electrophysiology Lab, a Heart Failure Clinic, cardiac rehab and cardiology care and management.
- A Robotic Surgery Program that offers minimally invasive surgery. Advantages of robotic surgery are fewer complications, shorter hospital stays, less pain and blood loss and a quicker recovery for patients.
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- A physician network group, Augusta Medical Group, with primary care and specialty physician offices throughout the region.
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- Ranked number 1168 on the Inc. 5000’s 2018 ranking of the nation’s fastest growing private companies—the 6th time to appear on the Inc. 5000 list.
CHARLES HENCK
Charles “Chuck” Henck is the former CIO at University of Maryland Faculty Physicians Inc., where he served in that role for nearly 19 years. Chuck has been a longstanding member of the Mary Baldwin community. He served as a member and is the former President of the Mary Baldwin Parents Council and has been a member of the AVB since September 2014. Chuck has also taken an active role in promoting broader awareness of the university and its newest initiatives. Chuck is the proud father of Mary Baldwin alumna Caitlin Henck ‘12. Cait was the recipient of one of the university’s highest honors, the 2012 Martha Grafton Award, and her experience at Mary Baldwin transformed her from a young girl to a confident, motivated young woman—a Boldly Baldwin woman. Cait lives in Bristol, UK, after moving from Copenhagen for professional advancement in November 2017. She recently celebrated her fifth anniversary with Epic Systems and spent a sabbatical in French Polynesia.

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