

The background of the image is a dark, monochromatic photograph showing the silhouettes of a large group of people, likely graduates, celebrating. Many individuals are seen from the chest up, with their arms raised high, holding and throwing their black graduation caps into the air. The scene is set against a lighter, hazy background, creating a sense of movement and joy. The overall tone is celebratory and triumphant.

# Congratulations Honors Scholars & Graduates 2023



J.N. Andrews  
Honors Program  
Andrews University









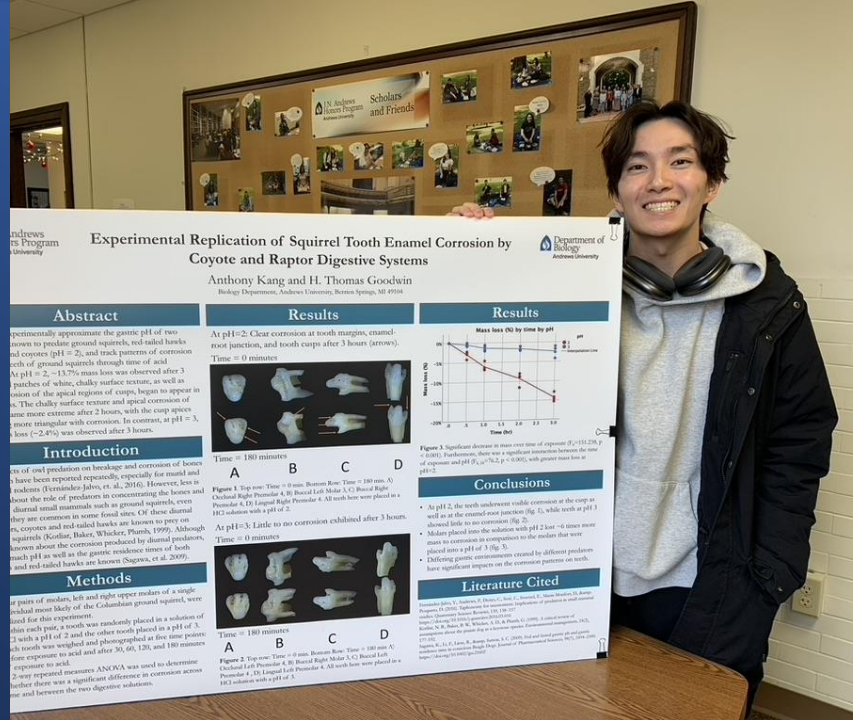


# Honors Family





# Honors Researchers







Honors Researchers





# Honors Researchers









# Wonderful Humans

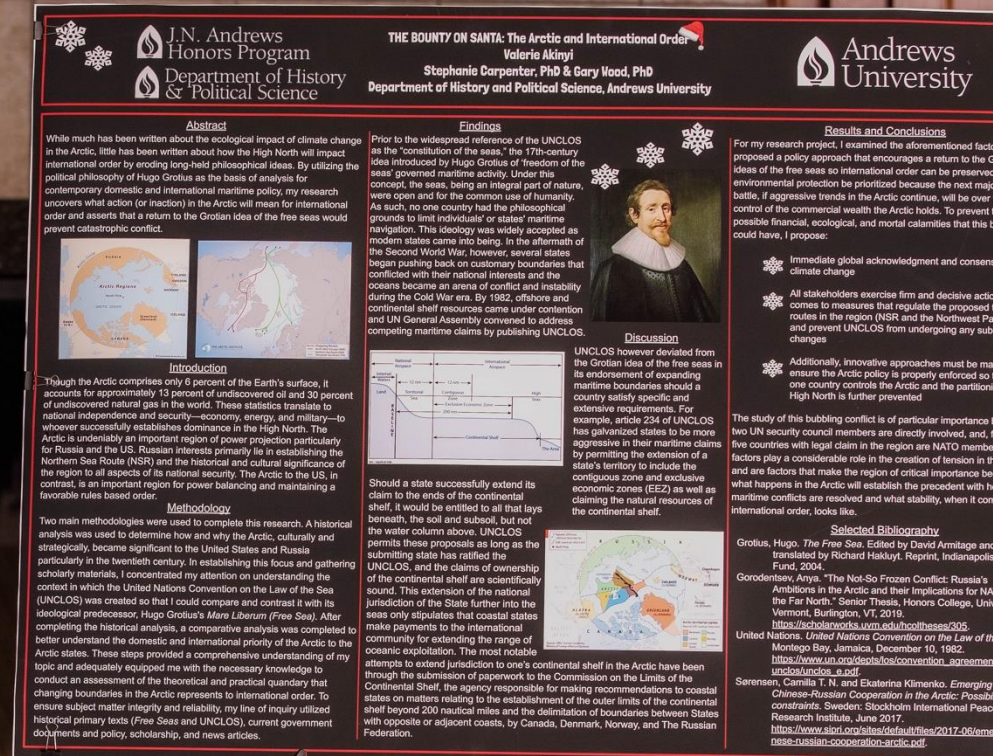






# Valerie Akinyi

- Political Science
- Minor: Environmental Public Health
- Moving to San Francisco to work as a policy specialist at Google; Studying for the LSAT





# *The Lion King*







- Art
- Minors: Biology and Chemistry
- Taking a gap year and then heading to Kettering College to pursue Radiologic Technology





# Surviving the Pandemic Together








# Alaina Burghardt

- Spanish and Global Studies
- Taking a semester off and applying to graduate schools for Spanish Translation



Documentary Film: "Berrien Springs: A New Stranger in Town"  
Alaina Burghardt  
Pedro Navia, PhD  
Department of International Languages and Global Studies  
J.N. Honors Program, Andrews University

Office of Research & Creative Scholarship  
J.N. Andrews Honors Program  
Department of International Languages & Global Studies


### Abstract

The presence of businesses owned and operated by persons of varying ethnicities and churches with congregations of groups such as Korean, Hispanic, Haitian, and Filipino people, makes it wonder how ethnically diverse Berrien Springs is, and how and when that diversity began. We will attempt to answer these questions by first researching at the local newspaper, heritage center, and village office to gather information on the community of Berrien Springs as well as interviewing members of select ethnic groups and prominent figures in the town's leadership to see how those who have moved here find it. This non-traditional research seeks to provide relevant information to the local community through visual medium.


### Previous Research

Berrien Springs was named after the Attorney General John Maypherson Berrien who was once a member of President Jefferson's cabinet. The Springs was added on later after the discovery of mineral springs near the town.

The whole of Berrien County became a hotspot for summer resorts because of the nearby lake and the St. Joseph river running through. This attracted many tourists that brought in a great deal of revenue for the towns. This also attracted many people wanting to run the resorts and create businesses of their own. During that time there was a large Greek population that had come over and lived in Berrien County since the late 1800s. Since then, that large Greek population has dwindled but it is possible that other ethnic groups have taken their place.




Courtesy, Museum of Berrien Springs



Nicholas Cottage at Pinehollow Resort, Berrien Springs, MI

### Demographics



Census Year	Non-Minority Population	Minority Population
1980 Census	~100	~20
2000 Census	~80	~15
2010 Census	~70	~10

Source: Census Bureau, U.S. Census Bureau, American Factfinder

### Methodology

1. **Collecting Information:** Researching the background of the town, the origins, reasons for settling here, businesses that have been here the longest, etc. Gathering demographic information of the town today and throughout the years as well as identifying businesses owned by people who have immigrated or moved here.
2. **Identifying key sources:** Selecting individuals that can provide more information about ethnic diversity throughout the history of Berrien based on their own experiences of living in the town. Some of the people who will be interviewed may not be from ethnic minority groups.
3. **Developing the story line:** Creating an outline of the documentary as well as writing a narration. We have crafted questions for the interviews and will select locations in which to conduct them as well as images of Berrien Springs that will be included in the documentary.
4. **Filming process:** Traveling to locations to begin recording. Individuals with filming expertise will assist us and they will provide the technical assistance and knowledge needed.
5. **Editing Process:** Selecting the recordings that we want to be included in the documentary and will add a narration.
6. **Presenting the Film:** Find venues to make the documentary available to the citizens of Berrien Springs as well as students and faculty of Andrews University. After the public showings we will upload it to YouTube through the Andrews University channel so that previous residents of Berrien Springs and Andrews alumni may see it.

### Interview Questions

1. What ethnicity or ethnic group do you identify with?
2. How many generations of your family have been in Berrien Springs?
3. When did you/your parents (grandparents, etc.) move to Berrien Springs?
4. Why did you/your parents (grandparents, etc.) move to Berrien Springs?
5. Have you found/did they find what you/they came to Berrien Springs?
6. What do you do for a living?
7. Have you faced challenges because of your ethnicity in Berrien Springs?
8. How welcoming have you found the community of Berrien Springs? Why?
9. Has your ethnic community grown since you have lived in Berrien Springs?
10. How large do you think your ethnic community is?
11. What type of community activities do you engage in?
12. What ethnic changes have you seen in Berrien Springs living here?
13. Do you interact with other ethnic groups in Berrien Springs? How?
14. Are you willing to interact with members of different groups?
15. How often do you interact with members of different groups?
16. How has Berrien Springs changed in the time that you have lived here?

### Progress Thus Far

So far we have collected data from past census to get of the racial demographics over the years. We have also information on the origins of Berrien Springs as well as has developed over the years. As seen above we have created interview questions that will be used in the interviews with participants. We are currently waiting on approval from that we can move forward with the interview process.

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3. Berrien County Historical Society. (2010). Berrien County, Michigan. Berrien Springs, MI: Berrien County Historical Society.
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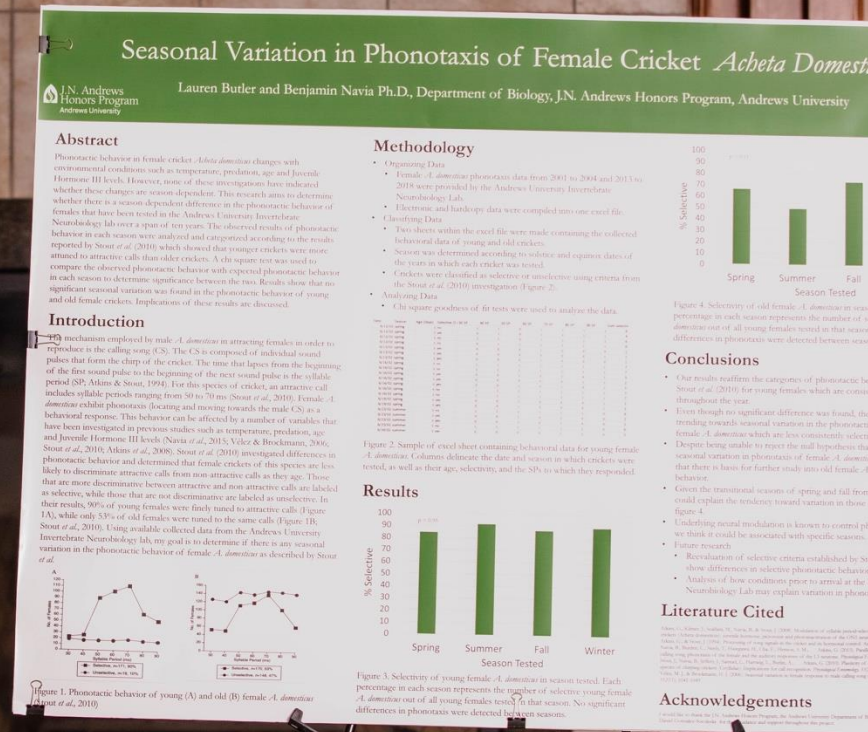


# Sharing a Meal





- Biology and Spanish
- Minor: Chemistry
- Loma Linda University School of Medicine on a full scholarship





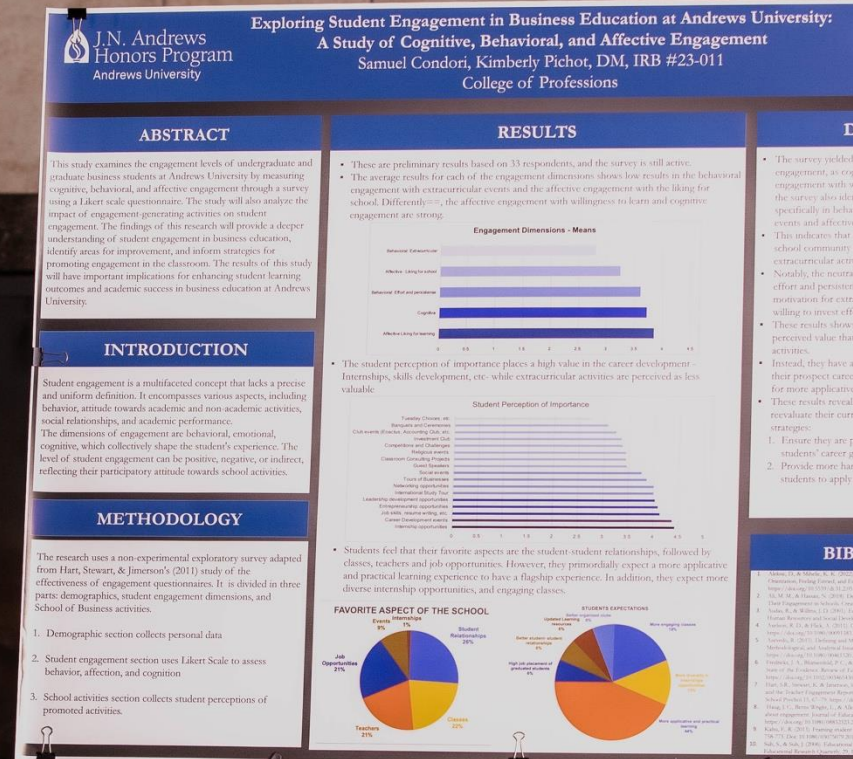
# Agape Feast and Theater Outings







- Marketing & Management
- Minor: Creativity & Entrepreneurship
- Pursuing a Masters in Business Analytics at Notre Dame - Mendoza College of Business and participating in the Management Internship at AdventHealth







# Cultural Adventures






# Hannah Cruse

- Psychology & Spanish






**Andrews University**  
IN. Andrews Honors Program

## El laberinto del fauno: A Child's Imagination and Coping with the Trauma of War

**Hannah Cruse**




Dr. Karl Bailey and Dr. Pedro Navia | Department of Psychology and Spanish | J.N. Andrews Honors Program | Andrews University



**13**

### Abstract

Guillermo del Toro's film *El laberinto del fauno*, known as *Pan's Labyrinth* to English speaking audiences, opens up a fantastical world that is just a touch away from reality, but everyone believes this to be the imagination of one child, Ofelia. She tries to complete tasks and learn the truth of the land of post Civil War Spain that she currently resides in while she waits for another. There are methods of psychotherapy for children such as rational emotive imagery, or REI, to create pathways to subdue stress and anxiety that come from difficult situations. Through the medium of imagery in psychotherapy, a child can cope with their traumatic experiences and learn solutions to the problems that they face in their reality everyday, as Ofelia did in her own situation. One could think that the director took a pessimistic approach by killing her in the end, after all, psychotherapy is supposed to have a positive impact on a person's life, but he tells a story of fantasy being reality, solidifying the importance of an active mind and storytelling, especially during tough times. A person's imagination can teach them how to live in the real world.

### Methodology

- **Film Analysis:** Taking a class on Latin American film and learning key tools about film analysis, especially themes and symbols.
- **Research Methods:** Reading previous research done in psychology over imagination and its use in psychotherapy, especially for children.
- **Historical Context:** Taking a history class in Spain, learning about the Spanish Civil War, and watching the movie with analysis from teacher.
- **Writing Experience:** Using previous experience writing for the Arts and Entertainment section of the Student Movement, providing analysis of several films and tv series.

### Analysis

**Historical Context of Film**

- *El laberinto del fauno* is set in 1944, six years after the end of the Spanish Civil War.
- The war was fought over 3 years and was fought over what type of government should rule in Spain.
- Francisco Franco, the current dictator, was in the midst of eradicating rebels in the mountain regions.

**The Three Tasks of Ofelia**


- The first takes her to a dying tree, in which lives a great frog that is killing it. She has to eat its liver to retrieve the key inside its stomach. This reflects her mother's pregnancy and her sadness due to it.
- In the second, she must enter the hall of the Pale Man, a child eating monster to retrieve a knife. She is not to eat anything on the table, but she eats him. This is a parallel to a scene where her stepfather, Captain Vidal, kills her before a great feast, but his true motivation comes from the mindless killings of innocent lives.
- The last takes her to the middle of the labyrinth where she is told to cut her brother's hair so he can escape the prison, which she refuses to do, dying as a result. This mirrors her stepfather's choice to save the son rather than the mother.

**Imagination in Psychology**

- A psychotherapy method for children called rational emotive therapy teaches how to control emotional response under stressful situations by mentally stimulating an engaging experience and practicing calm thoughts to process and release tension. (Pruitt & Smith, 2013)
- Children with imaginary friends seem to have better emotional intelligence. (Taylor et al., 2008)
- Mental simulation can be as real as actually experiencing the circumstance in reality and can be used for problem solving and coping. (Kuyper & Morsink, 2016) (Taylor et al., 1998)

**Comparison of Film and Psychology**

- The film mirrors what Ofelia experiences in reality, but in a way she can understand in her fantasy, much like mental simulation.
- When presented with the last task, Ofelia used what she learned previously to make the right choice and stay firm and calm in a stressful situation.
- Ofelia's death does not contradict the benefits of imagination, rather solidifies the fact by her triumph to the end and by her return to her true identity, a point affirmed by the director, Guillermo del Toro.



### Conclusion

The film upholds the idea that imagination and fantasy is helpful to children during traumatic experiences. It shows that lessons taught in the fantasy world allowed Ofelia to realize her reality and try to fight it, in her own small way. Psychotherapy and research further supports that imaginative experiences and the use of fantasy in children and adults help them cope with trauma and escape their real-world to navigate stressful situations. Guillermo del Toro points an optimistic point of view rather than a pessimistic one. Ofelia finally wins the chance to live her happily ever after, even if she died in the so-called "real world". Parents and teachers should let their imagination be shaped, because there they can give the tools necessary to navigate everyday life.

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Yo Yo Ma Concert





# Caryn Cruz

- English
- Minor: Political Science
- Taking a couple of gap years in Berlin before heading to law school

**“Who Can be a Victim?”: *I May Destroy You* as Intersectional Resistance to Rape Culture**

Caryn Cruz  
Dr. Vanessa Corredera

Department of English — J.N. Andrews Honors Program — Andrews University

**ABSTRACT:**

There exists a consistent white-washed, heterocentric framing when depicting sexual assault survivors on-screen, which thereby erases sidelined identities and communities from being acknowledged as victims of sexual violence. In turn, this erasure prevents them from participating in the discourse of addressing sexual assault. The HBO Max limited series *I May Destroy You* (2020) effectively resists that framing in its twelve-episode run. Instead, the show notably embraces minoritized identities that are not usually represented as survivors of sexual assault within media. By accurately depicting the initial trauma, processing, and the many rehabilitative stages of three Afro-British friends who experience different forms of sexual violation, the series sheds a light on both the varying forms of sexual assault and the multiple, individualized experiences each person encounters on their path towards healing. This project thus provides a close analysis of *I May Destroy You*, identifying both the visual and literary devices that create an accurate, nuanced, and intersectional approach toward addressing rape culture.

**METHODOLOGY:**

**Theoretical Framing as an Interconnected Framework:**

- Feminist Theory
  - Theoretical framework that examines the patriarchal order and its constructed shaping of equality between the sexes
- Queer Theory
  - A theoretical lens that examines social conceptions of queerness and its resistance against heteronormativity and binaried gender constructions
- Critical Race Theory
  - Academic scholarship that examines social conceptions of white hegemonic power and the existing racial discrepancies in society

**Media Analysis:**

- I analyze the visual and aural elements of the text, identifying the use of visual imagery, colors, camera angles, and aesthetics that illustrate the scene for the audience

**Close Reading:**

- By using close-reading techniques, I analyze and assess the significance of certain literary devices, important plot points, performance and delivery, dialogue, and the overall characterization of the characters to assist my analysis

**ANALYSIS:**

**Conventional Depictions of Survivorhood:**

- White, patriarchal society has formulated qualifications for who “counts” as a victim of sexual assault.
  - There is a construction of victimhood as “dressed in white” due to the recurring associations of whiteness, femininity, and fragility that white women have been suggested to embody (“White Tears” 90).
  - The recurring image of a “real” rape victim is depicted as a “naïve, sexually inexperienced, able-bodied, middle-class white woman conked over the head and dragged into an alley by a large, gun-wielding, brown man” (*Asking for It* 96).
  - The standard image of the cisgender, heterosexual, white woman in danger becomes interlaced with the social configuration of a victim, and therefore can be utilized as a tool of power (“White Tears” 84).

**IMDY Accurately and Intersectionally Characterized Survivorhood:**

- The intersecting identities (like considering race and queerness) of an individual can either exacerbate or mitigate their experience of sexual assault, trauma, and their journey towards healing.
  - Arabella: “Prior to being raped, I never took much notice of being a woman. I was busy being black and poor” (S1E7).
  - “[Intersectional subordination] is frequently the consequence of the imposition of one burden that interacts with preexisting vulnerabilities to create yet another dimension of disempowerment” (“Mapping the Margins” 1249).
- Victims are well-fleshed out characters and are not one-dimensionally portrayed as “token” minority identities.
  - The show focuses on Arabella as an individual, following moments of joy, sorrow, numbness, and even wrongdoing.
  - Arabella’s varied, colorful wigs throughout the show symbolically represent each phase towards healing.

**IMDY Accurately and Intersectionally Addresses Rape Culture:**

- Does not vilify consensual sex and other forms of physical intimacy; rather, it critiques non-consensual acts of sexual violation.
  - Portrays queer and black characters who unapologetically appreciate sex and pleasure—despite the social connotations around blackness, queerness, and sex that exist (“Trouble with Normal”).
- Presents ideal examples of combating rape culture, which offers an optimistic and attainable model of how to further dismantle it.
  - Arabella has a mostly supportive community
- Portrays realistic examples of existing rape culture notions that the characters face as a result of their identities and sexual experiences.
  - Kwame’s (a queer-black character) assault is not taken seriously by the police

**CONCLUSION:**

- *I May Destroy You* disrupts the conventional white-centric narrative that dominates awareness and the representation of dynamic in turn paves the way for more inclusive marginalized communities to embrace marginalized communities as victims of rape and sexual assault.
- The series seems to exclusively represent and despite reaching a marginalized audience, does not wholly represent other black men and women are practically excluded from the discourse of white women’s politics, which has been permanently based on the margin.
- All forms of legal, social, and cultural, inclusive and intersectional approach towards culture, and on-screen representation

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# Chicago Outings







# Irina Gagliu

- Psychology with a Pre-Professional Emphasis
- Minors: Sociology & English
- Pursuing an M.A. in Mental Health Counseling at Boston College





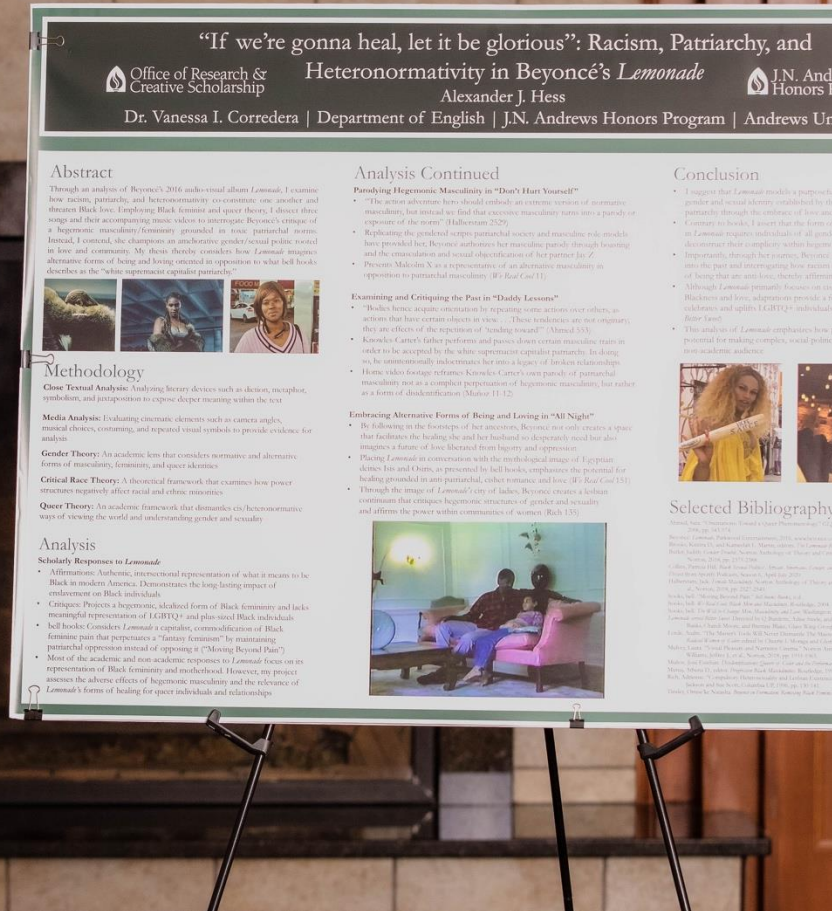


# Scholars & Friends





- English Literature
- Minor: Behavioral Sciences
- Attending the University of Maryland to pursue a fully-funded Master of Arts in English Literature, specializing in Women's, Gender, and Sexuality Studies







# Gathered Fun

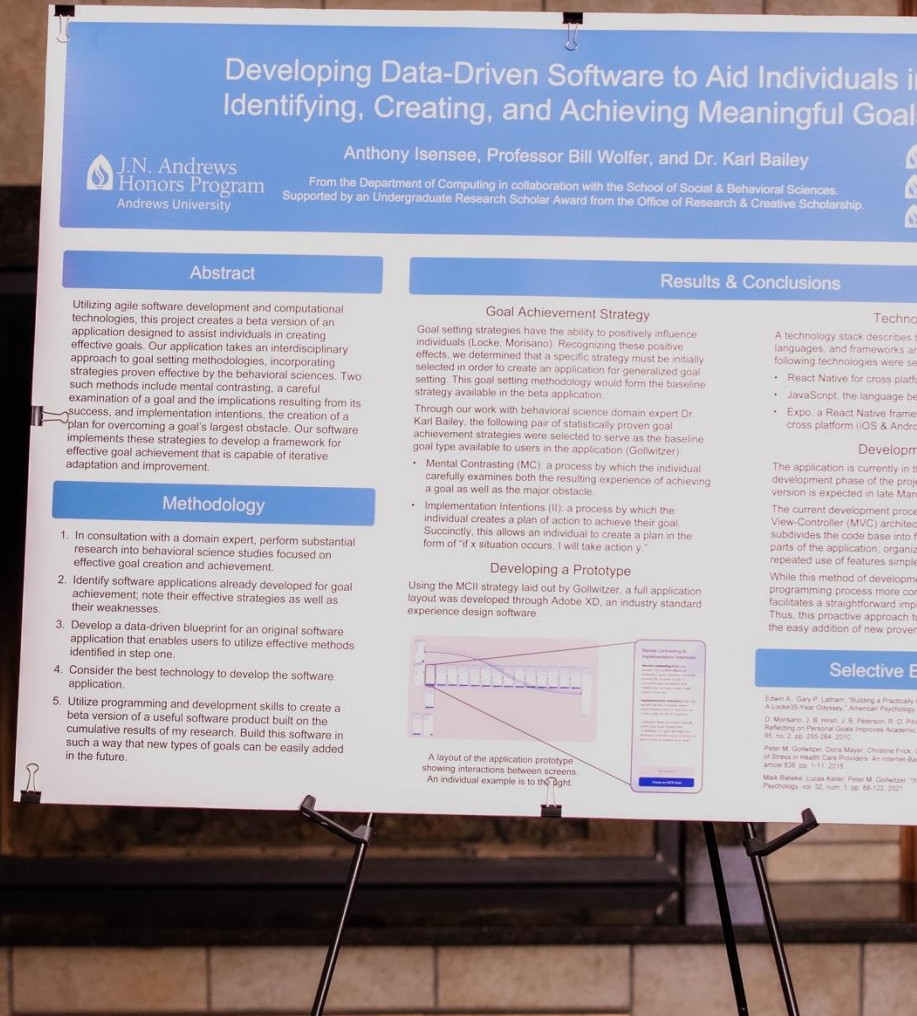
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# Anthony Isensee

- Computer Science
- Accepted a full-time remote position as a DevOps Engineer with Adventist Risk Management (ARM)







Good Times





Rael Kim, Desmond H. Murray, Ph. D., Denise L. Smith, Ph. D.  
Department of Chemistry & Biochemistry | Department of Biology

 J.N. Andrews  
Honors Program  
Andrews University

According to previous research, it was found that numerous naturally-occurring halogenated compounds have some significant biological properties. The primary objective of this research is to synthesize and observe the biological activity of TMZ hybrids, where a single molecular entity is derived from TMZ covalently linked via an amide bond to other compounds of known anticancer bioactivity. More specifically, this research aims to synthesize novel TMZ amides containing different halogenated aromatics, then evaluate the synthesized compounds' antiproliferative activity against drug-resistant drug-resistant C638. Compounds are synthesized through reflux and stirring, followed by vacuum filtration. Then, synthesized products are tested with a three-day LC50 assay.

- ◆ *Glioblastoma multiforme (GBM)* is one of the most aggressive and lethal forms of brain cancer and forms from astrocytes found in the brain or spinal cord. This form of brain cancer is highly lethal, mainly due to its high resistance to cell death, the uncontrolled proliferation of its tumor cells, active angiogenesis, and genomic instability (Zhang et al., 2012).
- ◆ Conventional chemotherapy for GBM uses Temozolomide (TMZ), a small lipophilic molecule that can cross the blood-brain barrier and thus access brain tumors. TMZ confers a median survival time of 14.6 months, about 2.4 months longer, than patients who do not receive TMZ chemotherapy.

❖ Several halogen-bearing hybrid compounds showed significant antiproliferative activity against five human cancer cell lines. In contrast, they did not show substantial antiproliferative activity against non-cancerous, normal cell lines (Li et al., 2018). Therefore, it is made evident that halogen-bearing hybrid compounds, novel TMZ amide hybrids made from halogenated anilines and TMZ acid, have the potential to be antiproliferative agents against cancer cells.

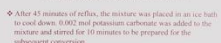
- ❖ This research aims to synthesize novel TMZ amide hybrids from TMZ acid and halogenated anilines: 4-chloroaniline, 4-fluoroaniline, 3-fluoroaniline, 2-fluoroaniline, 4-aminobenzotrifluoride.



Figure 2. Reaction Equation for TMZ Amide Hybrid Synthesis

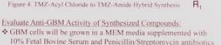
**Novel TMZ Hybrids Synthesis:**

- ❖ To synthesize novel TMZ amide hybrids, a two-step conversion from TMZ acid to TMZ-acyl chloride to TMZ amide synthesis method was performed.
- ❖ TMZ acid to TMZ-acyl chloride conversion: (1) 0.002 mol TMZ acid, (2) 0.0025 mol anhydride, and (3) 10 drops of dry dimethylformamide (DMF) were added to 25 mL of dry dichloroethane. The mixture was refluxed for 45 minutes to produce TMZ-acyl chloride.




◆ **TMZ-acyl chloride to TMZ amide conversion:** to the mixture, (1) 0.002 mol haloacetylated aniline reagent and (2) 0.002 mol diisopropylethylamine were added and continued stirring for 3 hours at room temperature.

◆ **Obtaining the product:** The reaction mixture was then poured into a 250 ml beaker containing ice and 10 ml 1M HCl, and 20 ml saturated  $\text{NH}_4\text{Cl}$ . After 15 minutes of stirring, the product was obtained through either extraction (no solids) or vacuum filtration (solids).



- ❖ Once the cells are grown, the appropriate number of cells will be separated into a 12-well plate containing 10,000 cells per well, which will be treated with TMZ and novel TMZ hybrids in various concentrations to assess the efficacy of the compounds as anticancer agents, in other words, to kill glioblastoma cells.
- ❖ Through the process, a lethal concentration of 50%  $LC_{50}$ , which is the concentration of the drug that kills half of the GBM cells, of the TMZ and novel TMZ hybrid will be determined.
- ❖ Theoretically, the lower the  $LC_{50}$ , the greater the toxicity.



100

Reagent	Color/Physical State	% Yield	IR/NMR
4-Chloroaniline	Yellowish white/solid	70.22%	IR, <sup>1</sup> H, <sup>13</sup> C
4-Aminobenzenesulfonamide	Pale yellow/solid	69.89%	IR, <sup>1</sup> H, <sup>13</sup> C
4-Fluoroaniline	Off-white/solid	75.54%	IR, <sup>1</sup> H, <sup>13</sup> C
3-Fluoroaniline	Off-white/solid	63.43%	IR, <sup>1</sup> H, <sup>13</sup> C
2-Fluoroaniline	Off-white/solid	71.04%	IR, <sup>1</sup> H, <sup>13</sup> C

Table 1. Synthesized Novel TMZ-Amino Hybrid Products

4-Chloroaniline TMZ-Amino hybrid

mmol	mg
0.5	~1000
1	~1500
1.5	~1200
2	~2500

Year	Male (thousands)	Female (thousands)
2000	~10,000	~11,000
2005	~10,500	~11,500
2010	~11,000	~12,000



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- ❖ Explore method

- ◆ Research
- ◆ Research
- ◆ Department
- ◆ J. N. A.
- ◆ Office

Research  
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- Biology
- Minor: Chemistry
- Loma Linda University  
School of Medicine





# Honors Buddy Lunch





# Isabella Koh

- English Literature
- Minor: Chemistry
- Travelling with family and friends and then working full-time as a professional writer


**Redefining Representation: Interrogating Race in Dominic Cooke's  
*The Hollow Crown: The Wars of the Roses* (2016)**

Office of Research & Creative Scholarship | J.N. Andrews Honors Program | Andrews University

Isabella Koh  
Dr. L. Monique Pittman | Department of English | J.N. Andrews Honors Program | Andrews University

### Abstract

Dominic Cooke's television adaptation of Shakespeare's early history plays, *The Hollow Crown: The Wars of the Roses* (2016), navigates the intersecting and often competing demands of diversity, authentic representation, and Shakespeare's universality. Although the television series strives to correct traditionally racist performance strategies through its casting of minority actors, it falters in that aim. Its over-reliance on titular white actors and the casting of multiethnic Sophie Okonedo as its major minority voice actively reinforce harmful racial and gender stereotypes. By addressing these concerns, this project intentionally develops ameliorative techniques of non-traditional casting and ethical representation.




### Methodology Cont.

**Creating and Analyzing a Paratextual Archive:** an examination and evaluation of instances created by modern production companies to balance diversity and authenticity in Shakespearean performance.

**Primary Data Collection and Analysis:** close textual analysis of the television series and plays involves a breakdown of textual and filmic patterns and meaning to provide evidence for argumentative claims.


### Analysis of Representational Pitfalls

- **Sophie Okonedo as Margaret**
  - "Skin color, that most visible sign of race, is read along with other actor traits" (Steigensalt 42)
- **Margaret as an Object of Curiosity**
  - "See the daughter prisoner?" *The Hollow Crown* 1.1.5.3.133
  - Costuming, mise-en-scene, and language choices objectify Margaret.
  - "[Racialization] is not benign. It involves 'othering,' which is used to justify subordinate status, unequal treatment, to secure oppression, and exploitation in numerous ways" (Osei & Winam 12).
- **Margaret as an Unfaithful Wife**
  - The Jezebel Stereotype: "delegat[es] all black women to the category of sexually aggressive women, thus providing a powerful rationale for the widespread sexual assaults by White men" (Collins 89).
  - Extramarital relationship between Margaret and Somerset foregrounded.
- **Margaret as Manipulative and Emasculating**
  - The Sapphire Archer: an antagonistic, confrontational black wife
  - "Am I a queen in life and style / And must be made subject to a duke?" *The Hollow Crown* 1.1.3.50-51
- **Margaret as an Angry Black Woman**
  - The Angry Black Woman: "Characteriz[ed] as shrill, loud, argumentative, irrationally angry, and verbally abusive" (Harris-Perry 8).
  - Margaret's brutal murder of the Duke of York triggers this stereotype.
- **Margaret's Loss – Black Pain as Entertainment**
  - Execution of Margaret's son, Ned: "O, kill me too!" *The Hollow Crown* 1.1.5.5.41
  - "Black bodies have a history of being the 'visible' objects for pain's public consumption" (King 15).



### Analysis Cont.

- **Margaret as a Magical Black Seer**
  - "Consuming, hair and makeup, and soundtrack are otherwise stills"
  - "Food, wrinkled words," "Witch-hood, without bag" *The Hollow Crown* 1.1.5.109-110
- **Margaret's Exclusion from a Unified Britain**
  - "Food [highlighted] were combined with the [other] [other] [other]"



### Conclusions

Although *The Hollow Crown* offers its participants in non-traditional casting its assistance with its promises to its public audience, it ultimately fails in its goal. By unconsciously emphasizing damaging stereotypes about black women through Margaret's character, the series extends these harmful patterns and shows that race cannot be blindly ignored in the casting process. The treatment of Shakespeare's history plays indicates a necessary framework shift: there has occurred "conversion" to a conscious interaction with the way race signifies in performance. A new method of literary casting is needed, in order to ethically bring people of color into these performance spaces. This method necessarily begins with the ability to listen, accept feedback, and make deliberate decisions about how individuals' stories will be portrayed, with race and its implications treated as an essential factor in this process.

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Winam, L. *Black Bodies, Black Pain: The Politics of Race and the Performance of Pain*. New York: Routledge, 2015.





# Chicago Symphony Orchestra & Agape Feasts









# Daryna Kulinich

- Animal Science, Pre-vet
- Minor: Chemistry
- Accepted a seat with the veterinary medicine class of 2027 at the University of Wisconsin, Madison



J.N. Andrews  
Honors Program  
Andrews University



Department of  
Sustainable Agriculture  
Andrews University





Surviving the Pandemic Together

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# Cameron Mayer

- Speech-Language Pathology & Audiology
- Minor: Spanish
- Pursuing a Master's in Speech-Language Pathology at Andrews University



**The Impact of Technology on the Developing Visual and/or Auditory Memory in School Aged Children**

**School of Community Sciences & Disorders**  
Andrews University

**Cameron Mayer, Dr. Cath White, PhD, CCC-SLP**

**Abstract:**

The purpose of this research was to investigate the impact of technology on the developing visual and/or auditory memory in school aged children. The research was conducted in a classroom setting with 20 children aged 8-10 years. The children were divided into two groups: a control group and an experimental group. The control group was given a traditional memory task, while the experimental group was given a memory task that incorporated technology. The results of the study showed that the experimental group performed significantly better than the control group on the memory task. This suggests that technology may have a positive impact on the developing memory of school aged children.

**Questions and Hypotheses:**

- 1. The purpose of this research was to investigate the impact of technology on the developing visual and/or auditory memory in school aged children.
- 2. The research was conducted in a classroom setting with 20 children aged 8-10 years.
- 3. The children were divided into two groups: a control group and an experimental group.
- 4. The control group was given a traditional memory task, while the experimental group was given a memory task that incorporated technology.
- 5. The results of the study showed that the experimental group performed significantly better than the control group on the memory task.
- 6. This suggests that technology may have a positive impact on the developing memory of school aged children.

**Methodology:**

The research was conducted in a classroom setting with 20 children aged 8-10 years. The children were divided into two groups: a control group and an experimental group. The control group was given a traditional memory task, while the experimental group was given a memory task that incorporated technology. The results of the study showed that the experimental group performed significantly better than the control group on the memory task. This suggests that technology may have a positive impact on the developing memory of school aged children.

**Results:**

Group	Control	Experimental
Visual Memory	10	15
Auditory Memory	12	18

**Conclusions:**

The results of this study suggest that technology may have a positive impact on the developing memory of school aged children. This is an important finding as it suggests that technology may be used as a tool to help children with memory difficulties. Further research is needed to confirm these findings and to explore the underlying mechanisms of this effect.

**Limitations:**

The limitations of this study include the small sample size and the lack of a control group. Future research should aim to address these limitations by conducting a larger study with a more diverse sample and a control group.

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- 1. Smith, J. (2018). The impact of technology on the developing memory of school aged children. *Journal of Educational Psychology*, 110(1), 1-10.
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Andrews University

**JAN Andrews**



Better  
Together







- Pre-Physical Therapy
- Pursuing DPT graduate studies at Andrews University's Physical Therapy program





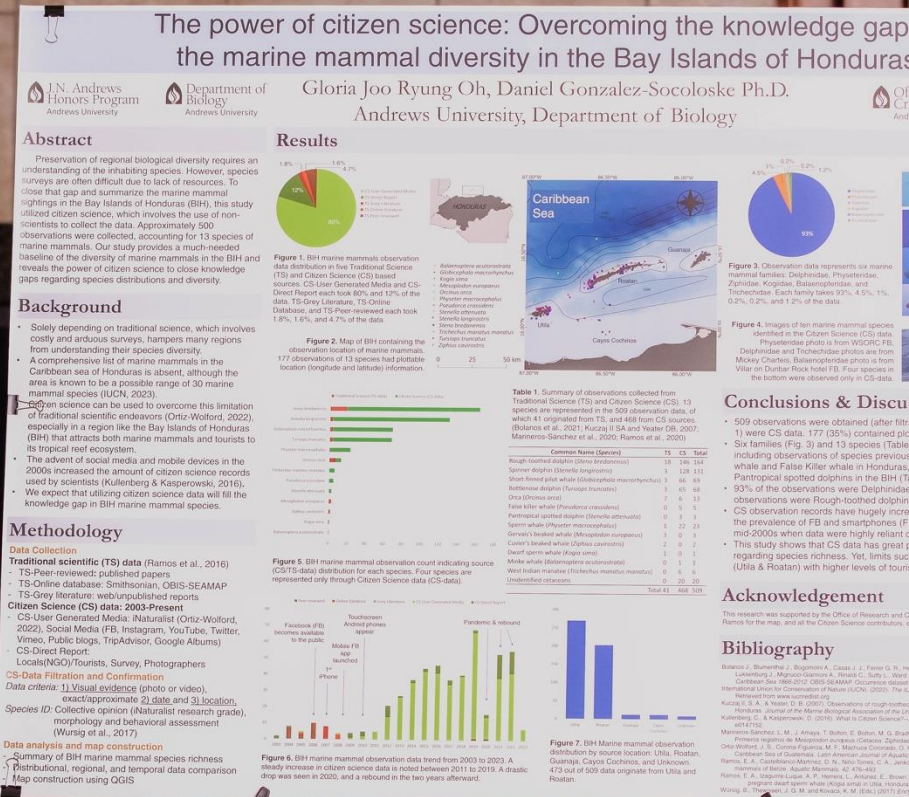
Surviving the Pandemic Together





# Gloria Oh

- Biology
- Minors: Chemistry and Agriculture
- Apply to Medical School, work as a tutor, and set up the Refillery in Benton Harbor and Berrien Springs (AU campus)





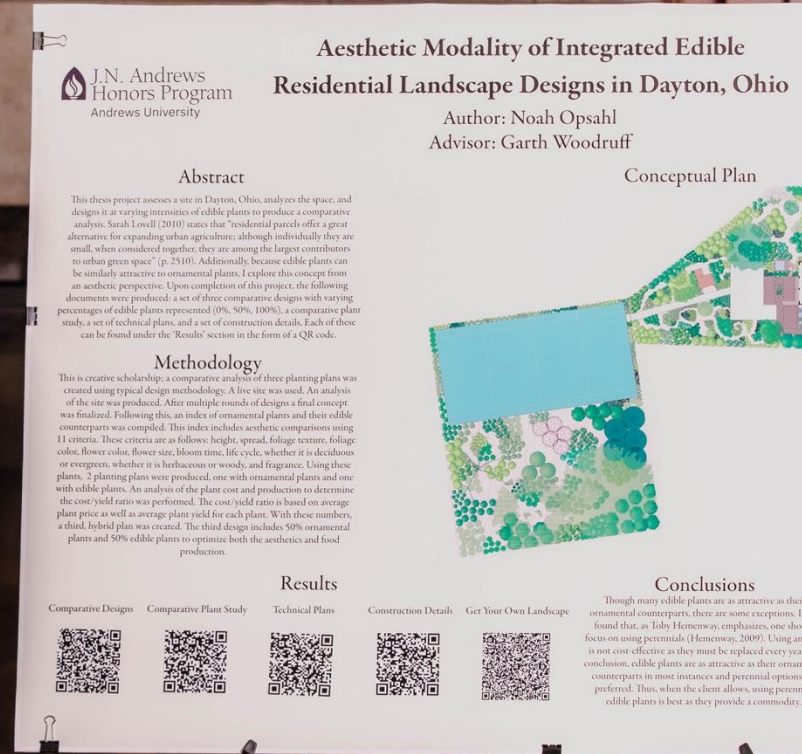




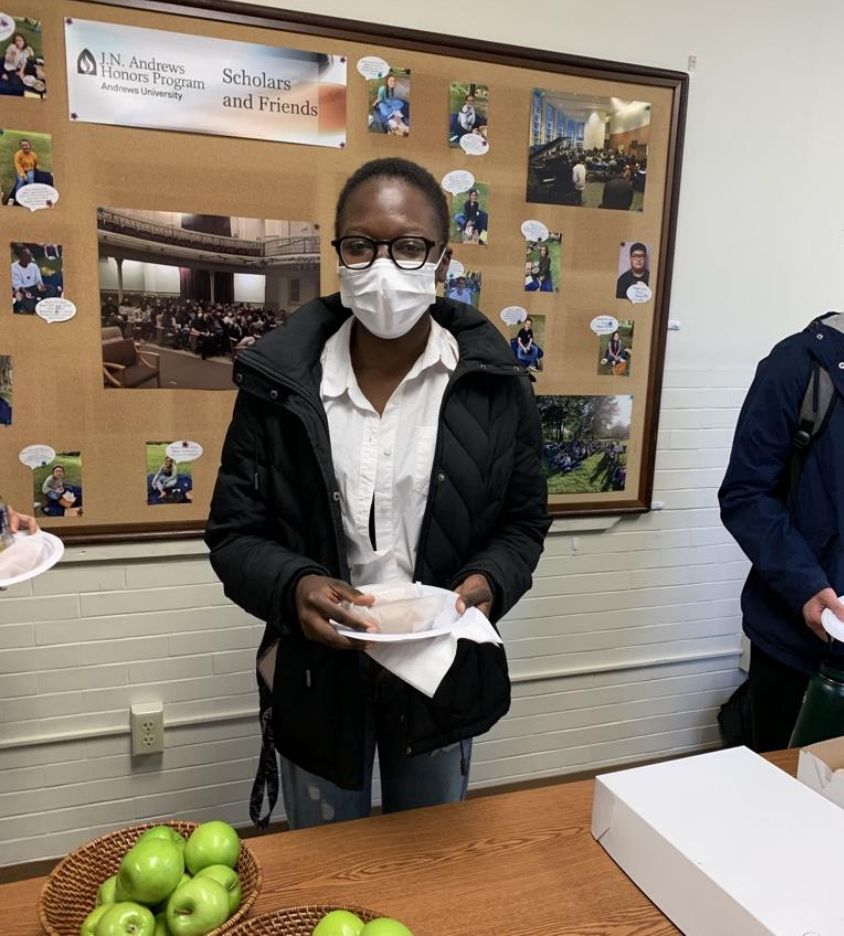


# Noah Opsahl

- Horticulture; Landscape and Environmental Design
- Owns and operate Perennial Designs, a landscape design firm in Southwest Michigan







Let's Eat!





# Richard Powell

- Business Administration
- Minor: Chemistry
- Applying to Medical School

Andrews University  
Research & Student Success

Andrews University  
Research & Student Success

Determining the Optimum pH for Mushroom Enzyme T

Richard Powell, David Nowack, Ph.D. Department of Chemistry and Biochem

ABSTRACT

In mushrooms, the small molecule melanin has several functions. These include regulation of cell development, supporting microbial pathogenesis, participating in energy harvesting, and protecting against cell damage from harsh factors such as ultraviolet light, oxidizing agents, and ionizing radiation. The enzyme tyrosinase is responsible in part for the production of melanin. We determined the optimum concentration and pH for tyrosinase under the conditions of the experiment. Tyrosinase had the highest  $V_{max}$  at a pH of 7.0 and a concentration of 0.08 mg/mL. Spectrophotometry of dopaquinone was used to determine the enzyme activity.

METHODOLOGY

The project is ongoing, thus the following section will describe the portion of the research that was completed for this presentation. The methodology contained two parts. Part A consisted of determining the kinetic constants of tyrosinase enzyme. The  $K_m$  and  $V_{max}$  were determined. The researchers kept the enzyme amount constant along with the buffer, while the L-DOPA amounts change. The L-DOPA, tyrosinase and buffer were pipetted into cuvettes and the absorbance was read at 475 nm using a spectrophotometer.

Reagents

ml.

Tyrosinase

1.2

L-DOPA

0.5

Phosphate Buffer

1.3

Total

3

Settings

ml.

wavelength

475 nm

baseline

buffer

tyrosinase conc.

0.08 mg/mL

L-DOPA conc.

15 mM

Figure 1: The absorbance of the reaction mixture was recorded over time using a spectrophotometer (left).  $V_{max}$  values were recorded and later used for calculations as shown in Table 1. The reaction mixtures, prepared in cuvettes, consisted of the reagents, the reactant, and the buffer. Other cuvette settings for the experiment are shown in the table (right).

Figure 2: The  $V_{max}$  and  $K_m$  values are determined from the Michaelis-Menten and Lineweaver-Burk Plots.

RESULTS

time (s)	pH 6	pH 7	pH 8
0	0.017	0.024	0.060
15	0.017	0.027	0.062
30	0.030	0.030	0.064
45	0.039	0.039	0.062
60	0.045	0.045	0.067
75	0.050	0.056	0.066
90	0.064	0.064	0.066
105	0.071	0.071	0.068
120	0.075	0.075	0.068

Table 1: Shows sample absorbance of reaction mixtures at three different pH levels.

The researchers varied the phosphate buffer used in the experiment from the original pH 7.0 to see how the  $V_{max}$  and  $K_m$  of the reaction were affected. The enzyme rate was calculated based on the absorbances obtained via spectrophotometry. The pH where the enzyme is most effective was determined to be its pH optimum. The absorbance is a measure of how much light is absorbed by the product mixture over time and therefore indicates the enzyme activity. These values were recorded using a spectrophotometer in 15-second increments for 2 minutes. The data in Table 1 corresponds to the conditions in Figure 1 at the time from the beginning of the reaction for the 3 pH conditions.

Michaelis-Menten

Lineweaver-Burk Plot

Figure 2: The  $V_{max}$  and  $K_m$  values are determined from the Michaelis-Menten and Lineweaver-Burk Plots.

	pH7	pH6	pH8
Average	0.0983	0.0373	0.0511
Std. Dev.	0.00619	0.00284	0.0011

Table 2:  $V_{max}$  (left) and  $K_m$  (right) values as well as standard deviations for different pH conditions. The standard deviation shows how spread out the data is. This helps answer the question, "Can the data be reproduced?"

	pH7	pH6	pH8
Average	0.294	1.40	0.281
Std. Dev.	0.0955	1.38	0.013

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Theater Fun

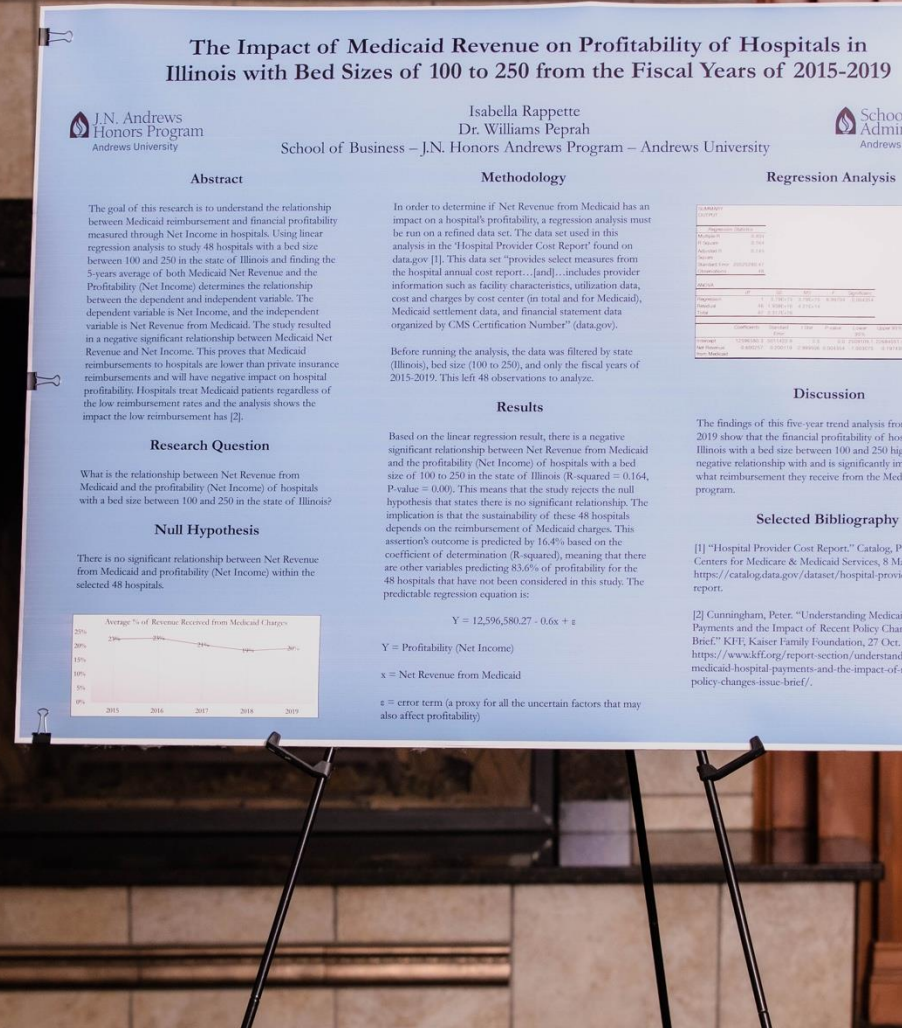




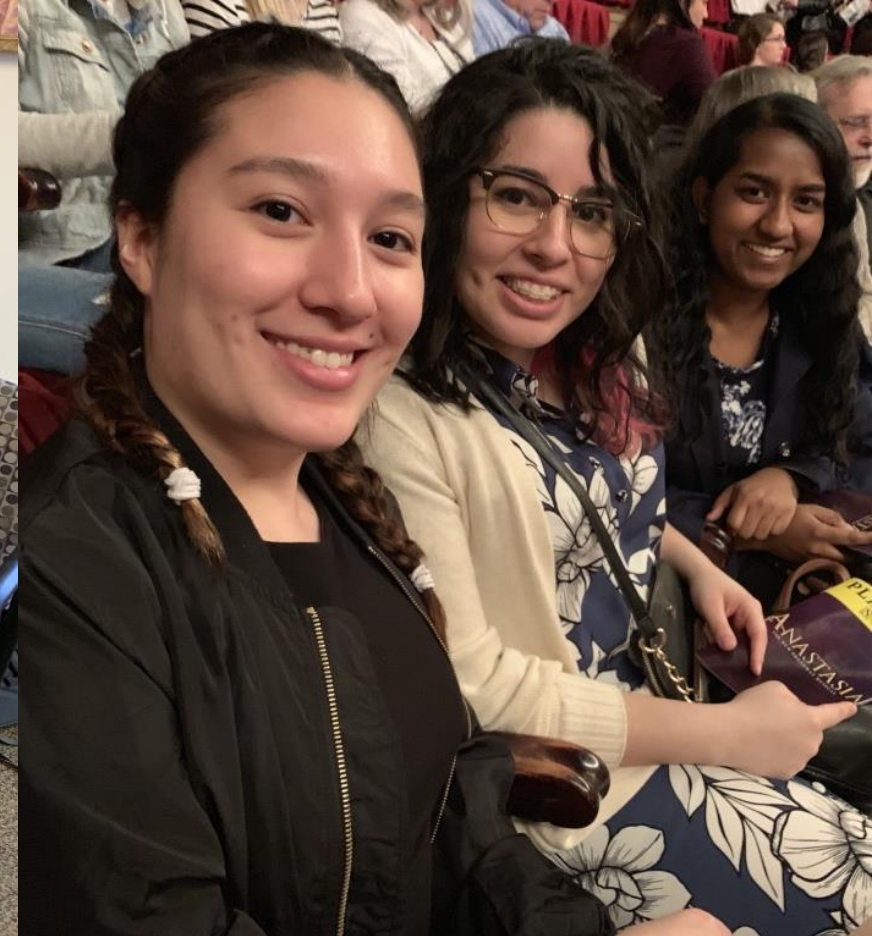


# Isabella Rappette

- Finance
- Moving to Orlando, FL to start work as a Supply Chain Resident at AdventHealth







At Home & Out & About







# Determining the Origins of Helix Glitches in LIGO's H1 and L1 Detectors

Andrews University  
J.N. Andrews Honors Program

## Kara G. Shepard & Dr. Margarita Mattingly

Department of Physics, Andrews University  
karas@andrews.edu

### Abstract

Due to their sensitivity, LIGO's detectors are highly susceptible to short bursts of noise, known as glitches, which can disrupt gravitational wave signals. This project searches for and analyzes potential causes of the Helix glitch, which has occurred during all of LIGO's operation runs, in both detectors. The date and time of each individual occurrence were compared with the simultaneous events taking place in the detectors to search for any correlations. In L1, it was discovered that issues with the Y-arm laser and end test mass accounted for 50% of occurrences, however these issues were not observed in H1.

### Methodology

- Using the database of glitches, and extracting all instances of the Helix glitch, it was found that the Helix glitch had occurred 272 times in H1 and 705 times in L1.
- The individual universal times for each instance were cross-listed with electronic logs recorded for each detector.
- Factors occurring around the time of the glitch were identified and recorded.
- 80 glitches in H1, and 350 glitches in L1 could not be correlated with a single cause. These were removed from analysis.
- The remaining glitches were analyzed to find the most common, strongly correlated, probable cause.

### Results

#### Hanford:

Figure 2: Distribution of glitch occurrences in H1. (1) Distribution correlated with the five most common probable causes and (2) distribution over the four observing runs.

#### Livingston:

Figure 3: Distribution of glitch occurrences in L1. (1) Distribution correlated with the five most common probable causes and (2) distribution over the four observing runs.

### Conclusions

#### Hanford:

In this detector, occurrences were high wind speeds, lockloss, seismometer noise, and winter weather conditions. Of the most glitches, occurring along the same time, were the most analyzable glitches. This is not to say, however, and the second highest for 54 (28.1%) glitches.

#### Livingston:

Unlike H1, occurrences were more common in the Livingston detector were not observed in the Hanford detector. This correlated with over 50% of the analyzable glitches, for 59.7% of the glitches.

Interestingly, the most probable cause for the glitches in the Livingston detector were not observed in the Hanford detector, but in the Livingston detector, this was seismic activity, but in the Hanford detector, this was a large number of glitches.

Perhaps the most interesting result was when problems with the auxiliary lasers in L1. Other than this cause, accounted for 16 more occurrences of auxiliary lasers were not observed.

### The LIGO Collaboration

The LIGO Collaboration has built some of the most sensitive detectors on the planet in order to detect gravitational waves. Due to this heightened sensitivity, they also detect noise from other sources besides gravitational waves. These noise detections cause glitches in the detector, which can obscure true gravitational wave signals. Thus, it is important to study these glitches, and how they can be reduced or eliminated.

To this end, all of the glitches that occur in LIGO detectors are collected in a database where they are categorized according to: type of glitch, which detector the glitch occurred in, the date, and exact universal time that the glitch occurred.

There are around thirty different types of glitches that have occurred regularly in the Hanford and Livingston detectors. The origins of most of these have been discovered, but there are a few, such as the Helix glitch, which have not been resolved. One hypothesis is that they are caused by malfunctions in the auxiliary lasers, which are used to calibrate the detectors.

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- [2] Meggs, K. "Reduction of transient noise artifacts." (2020).
- [3] Davis, M. et al. (2020). "Machine Learning for Glitches in the LIGO and Virgo Detectors." *Physical Review D*.
- [4] Images courtesy of [www.nasa.gov/missions/gravity](https://www.nasa.gov/missions/gravity).

# Kara Shepard

- Physics and Mathematical Studies
- Applying for jobs, traveling with family





Chicago Symphony Orchestra





- Music Composition
- Pursuing a Master's Degree in Composition with funding at the San Francisco Conservatory of Music

[illegible]





Chicago Symphony Orchestra

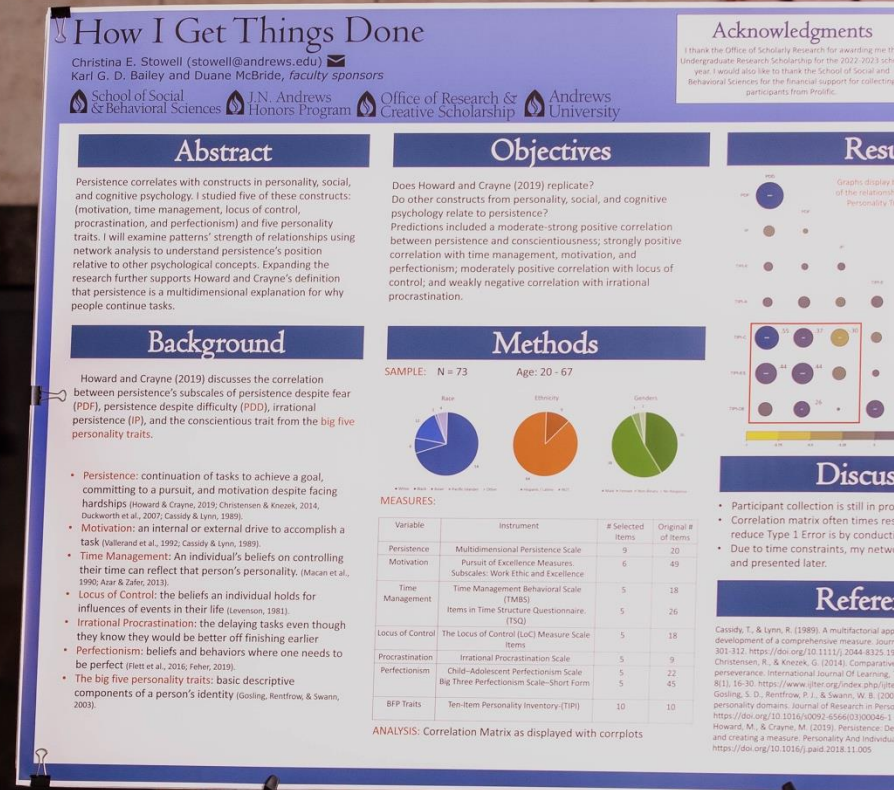






# Christina Stowell

- Pre-Professional Psychology
- Minor: Community and International Development
- Pursuing a Master's in Educational Psychology at Andrews University





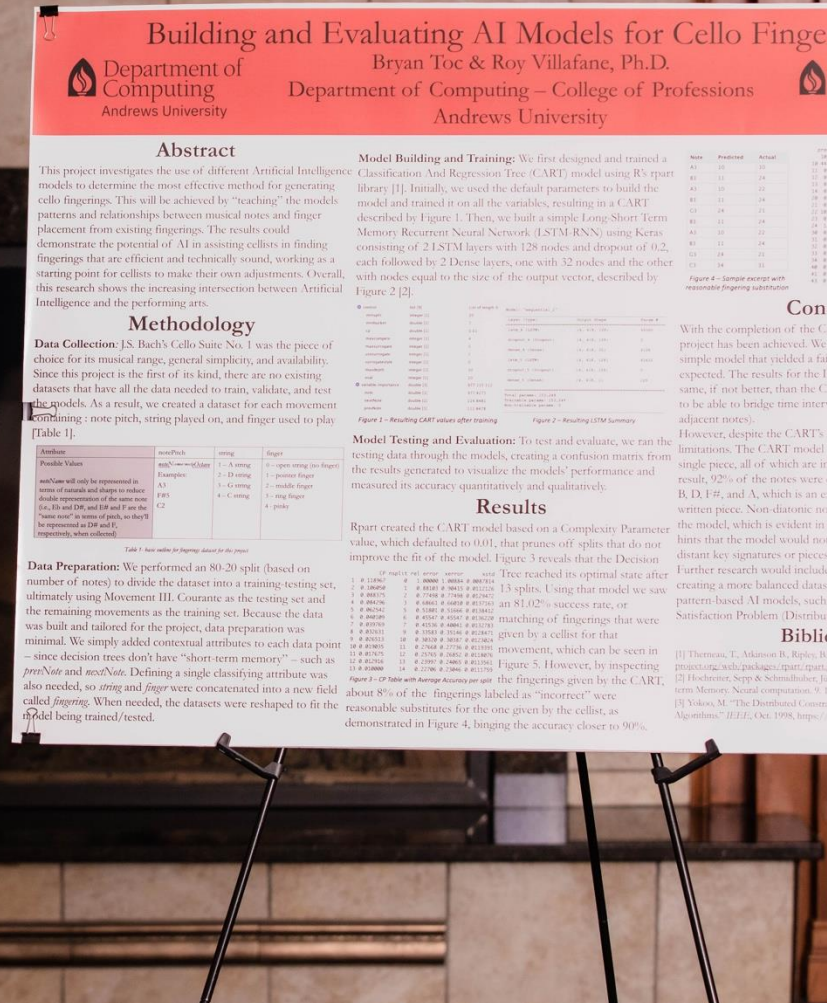
# Pandemic Socializing







- Computer Science
- Pursuing graduate study





# Scholars & Friends







# Enlai Wang

- Biology
- Minors: Chemistry and Psychology
- Working as a student missionary in Bangladesh before going to Loma Linda University School of Medicine

Office of Research & Creative Scholarship  
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## The Effects of Novel Valporyl-Purine Hybrid Compound on Intracellular Myo-Inositol Levels of Lymphoblast Cells

Enlai Wang, Dr. Marlene Murray, and Dr. Desmond Murray  
Biology Department, Chemistry & Biochemistry Department, Andrews University, Berrien Springs, MI

### Abstract

Bipolar disorder (BD) patients display disrupted myo-inositol levels in their brains. Abnormally high levels of intracellular myo-inositol occur in the manic phase of BD. Valproic acid is used to treat this phase. Parallely, lower myo-inositol levels are found in the depressive phase. Although no specific drug exists for the depressive phase, antidepressants are used. Since purines have been shown to have antidepressant properties, we hypothesized that purines can be used to treat the depressive phase of BD by increasing myo-inositol levels in BD patients. To test this hypothesis, purines and a valporyl-purine hybrid is being explored to assess its effects on myo-inositol levels in lymphoblast cells taken from BD patients. The formation of the hybrid compound's amide and one of its components, purines, will be analyzed and its effect on intracellular myo-inositol levels will be measured.

### Introduction

Bipolar disorder is the 6th leading disability worldwide according to the World Health Organization and is characterized by two phases: manic and depressive. BD1 patients have manic episodes while BD2 patients have more depressive episodes. Currently, mood stabilizers such as lithium and valproate are being used to treat the manic phase potentially through decreasing intracellular myo-inositol (Harwood, 2005).

On the other hand, studies point to decreased myo-inositol levels in the brains of depressive patients (Shimon et al., 1997) and antidepressants have been used to treat the depressive phase of bipolar disorder (Compton & Nemereff, 2000). However, they have been shown to trigger the manic phase. Whether this transition is due to an increase in myo-inositol levels remains unknown.

Purine-based compounds such as inosine have been shown to have antidepressant-like effects (Kaster et al., 2013). However, there has not been any research on the effect of purine-based compounds on myo-inositol levels.

This is an exploratory research study that hopes to create a novel hybrid drug that can manipulate intracellular myo-inositol levels. The idea of a hybrid drug targeting both directions of myo-inositol dysregulation was inspired by Kim's research in which a hybrid drug of valproate with caffeine was synthesized and its effect on myo-inositol levels tested on the yeast model *Saccharomyces cerevisiae*.

### Methods

**Aim 1: Synthesize a novel compound with valproic and purine components.**  
Valproic acid was refluxed with a Cl-agent to form an acyl chloride. Acyl chloride was then refluxed with purine to form valporyl-purine amide. The product was extracted and dried. Then, isolated through gravity filtration and rotavapor. Lastly, IR and NMR were then used to identify the product.

**Aim 2: Determine the effect of the hybrid compound and its purine component on intracellular myo-inositol levels on BD cell lines.**  
- Mammalian cell from a bipolar II patient and a neurotypical patient was grown in varying concentrations of the purine component 2-amino-6-chloropurine for 48 hours at 30 C.  
- Cell extracts were created and analyzed for the presence of inositol.  
- The myo-inositol was measured by the oxidation of myo-inositol by myo-inositol dehydrogenase (MIDH) which was coupled to the re-oxidation of NADH by iodotetraazolum chloride (INT) and diaphorase. The resultant formazan was measured spectrophotometrically (Figure 2).  
- Concentration of myo-inositol was determined by interpolating from a standard curve (Figure 3).

**Hybrid Synthesis:** Seven or respective purines 2-amino amine, and 2-fluoro-7H-purine was initially used, 1-chloro was used instead a synthesis process. Synthesis further with IR and NMR to compounds.

**The Effects of Purine on Myo-Inositol Concentration in Lymphoblast (Figure 4)**

**Figure 1:** Valproic acid combined with one of the purines tested, 2-amino-6-chloropurine to make hybrid compound.

**Figure 2:** Redox reactions of how myo-inositol is converted to INT formazan.

**Figure 3:** Standard curve calculated by using known myo-inositol concentrations to calculate unknown concentrations.

**Figure 4:** Myo-inositol concentrations were from BD2 and neurotypical patients that were analyzed.

**Figure 5:** Possible hybrid compound analysis through IR and NMR.

**Bibliography:**

- Compton, M. T., & Nemereff, C. B. (2000). Psychiatry. 41. Suppl 9. 12-17.
- Harwood, A. (2005). Lithium and bipolar disorder. Molecular psychiatry, 10(1), 1-11.
- Kaster, M. P., Baume, J., Gass, M., & Cui, C. (2013). The effect of inosine on intracellular myo-inositol levels in lymphoblasts. Psychiatry, 154(1), 1-11.
- Shimon, M., Aggar, G., Ben-Zur, R., & Cui, C. (2013). The effect of inosine on intracellular myo-inositol levels in lymphoblasts. American Journal of Psychiatry, 154(1), 1-11.





Honors Church





# Andrew Wee

- Biochemistry
- Attending Loma Linda University School of Medicine

**Revisiting of the Extraction of Caffeine from Organic Chemistry**

Andrew Wee, Dr. Lisa Ahlberg  
Department of Chemistry and Biochemistry, J.N. Honors Program, Andrews University

**Abstract**

Organic chemistry is one of the core classes needed for people interested in pre-professional programs such as Pre-Med and Pre-Dent. One of the first labs in organic chemistry involves the extraction of caffeine from a source such as coffee beans, tea bags, or maybe even caffeine tablets. Often organic chemistry students have difficulties extracting caffeine and getting a desirable result. My goal for this research is to simplify this lab procedure by determining the best caffeine source that results in the highest yield. Additionally, I want to use a green solvent to minimize the damage that could be done to the environment and the students. A better solvent could also lead to better overall results for many.

**Introduction**

Caffeine extractions are one of the core experiments performed in an organic chemistry lab class. This experiment has been performed for many years by organic chemistry students however, from personal experience and observations of other students the lab was not successful for many students. No product was the most common result for many. Since this is an experiment performed at the beginning of the semester, the goal of this research was to provide a revised version of the procedure while also trying to use a potentially greener solvents. Through this research, the hope is to find the highest yielding caffeine source while using the safest solvent possible for the environment and the students. If most students can get a better percent yield of caffeine, I believe it will help their confidence in future labs. The caffeine sources that were tested are coffee grounds, tea bags, and NOZ tablets. Dichloromethane was the solvent used for determining the highest yielding caffeine source. The procedure was kept constant for all the caffeine sources to provide accurate results.

**Methodology**

- Goal: Determine the best source of caffeine
- Caffeine sources: coffee grounds, tea bags, NOZ tablets
- Place caffeine source into 100 mL of deionized water and heat this solution
- Vacuum filter the solution using the proper apparatus, which excludes the solid particles
- Transfer solution to separatory funnel and add dichloromethane
- Used about 60 mL of dichloromethane in 20 mL increments
- After adding dichloromethane, shake the separatory funnel and vent
- Two layers should appear. The bottom layer is the dichloromethane with the caffeine and the top is the aqueous layer. Measure the amount of emulsion present
- Extract the bottom layer into an Erlenmeyer flask
- Repeat with 20 mL increment of dichloromethane
- Solution in Erlenmeyer flask dried with anhydrous sodium sulfate
- Once dried, filter the solution either with gravity filtration or vacuum filtration into another Erlenmeyer flask that was previously weighed
- Place the flask with the solution on a hot plate and evaporate the solvent
- Caffeine should be left behind as the final product

**Results**

Caffeine from Coffee Grounds		Caffeine from Tea Bags	
Experiment Number	Percent Yield Based on Grams of Coffee Grounds	Experiment Number	Percent Yield Based on Grams of Tea
1	0%	1	7.59%
2	1.45%	2	6.39%
3	10.9%	3	4.59%
4	30.7%	4	3.77%
5	6.77%	5	7.57%
6	6.77%	6	3.71%
Average	9.96%	Average	5.60%

**Caffeine from NOZ Tablets**

Experiment Number	Percent Yield Based on Grams of NOZ Tablets
1	20.23%
2	27.19%
3	49.32%
4	29.98%
Average	31.68%

**Conclusions**

Based on the percent yields obtained from the experiment it is evident that the NOZ Tablets are the potential best source. It will give the students the highest potential yield if performed correctly. Additionally, the amount of emulsion was the smallest compared to the coffee grounds and tea bags. Future plans: Test different solvents (maybe ethyl acetate, ethanol, methanol, or acetone) with the caffeine source solvent would be a green solvent (environmentally friendly).

**Selected Bibliography**

Hamp, A. (1996). "The Extraction of Caffeine from Tea: A Modification of the Procedure of Murray and Haines." *Journal of Chemical Education*.  
<http://www.vlab-andrews.edu/2011/1/1/Extraction-of-Caffeine-from-Tea-Modified-Procedure-of-Murray-and-Haines/>

**Images:**

- Aqueous Layer
- Emulsion
- Organic Layer





# Honors Church







Better Together





# Terika Williams

- English and Spanish
- Minor: Biology
- Pursuing a fully funded M.A in English Literature at the University of Kentucky

J.N. Andrews  
Honors Program  
Andrews University

Department of Biology  
Andrews University

## A Study of the Reciprocal Interactions of Folates and Carboxypeptidase O

Terika Williams and Peter Lyons  
Department of Biology, Andrews University, Berrien Springs, MI 49104

### Abstract

Folate is a necessary vitamin for cellular growth. Naturally, folate has many glutamate amino acids, which must be removed prior to folate absorption and function. Carboxypeptidase O (CPO) is an enzyme that may remove these glutamates. To test this hypothesis the growth rate of MDCK cells with and without CPO grown with folate present was examined. No significant increase in growth was observed in cells with CPO. However, further experiments examining the interaction of purified CPO and folate showed the enzymatic activity of CPO to increase in the presence of glutamate-extended folate, thus supporting a relationship between CPO and folate.

### Introduction

- Folate is an important vitamin for pregnancy, healthy cellular growth and the replication of DNA. Folate deficiency has been tied to cancer.
- Folate is absorbed in the small intestine and has negatively charged amino acids (Pre-Glu) 1-7 glutamic acids which must be cleaved in order for the body to absorb folate.
- CPO is an enzyme that works by binding to negatively charged amino acids to create products.
- The goal is to explore the possibility that folate and CPO work together to facilitate cell growth.




Figure 1: The chemical structure of folate with glutamic acid. Sourced from <https://en.wikipedia.org/wiki/Folate#/media/File:Kleavelle%20folate%20chem%20img>

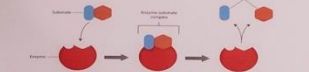



Figure 2: A diagram of how CPO, the enzyme, potentially works with folate, the substrate, to cleave glutamic acids from folate. Sourced from [https://reading.widomax.com/Research/processed\\_n/77/om\\_Figure1\\_Engineer\\_5840802\\_1746051400.jpg](https://reading.widomax.com/Research/processed_n/77/om_Figure1_Engineer_5840802_1746051400.jpg)

### Methodology

**Cell Culture**

- Madin-Darby Canine Kidney (MDCK) cells were used as a cell model for human cells. One group of cells did not have CPO while the other did.
- The cells were grown in Dulbecco's Modified Eagle Medium (DMEM) which contains folate and Roswell Park Memorial Institute (RPMI) that lacks folate.
- Cell Counting Kit 8 (CCK8) was used to measure the cell growth. CCK8 darkens in color if there is a high number of cells present. A spectrophotometer was used to quantify the difference in color at 450 nanometers (nm).
- This experiment was repeated 3 times.



### Methodology

**Enzyme Assay**

- Purified zebrafish (*Danio rerio*) CPO was mixed with folate and substrate to determine if CPO's activity is inhibited by folate. The substrate changes color when the enzyme, CPO, works on it and creates a product.
- A spectrophotometer was used to quantify the difference in color at 340 nm. The less product formed means that less light will be able to pass through the mixture.

### Results

**The presence of CPO grown in DMEM or RPMI does not affect MDCK cell growth rate.**

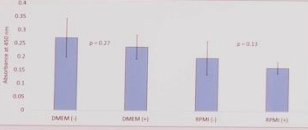


Figure 4: A bar graph illustrating that cells without CPO and with CPO, (i) and (ii) respectively, do not grow at a significantly different rate in DMEM and RPMI. The error bars show the standard deviation of each sample group. The p-values from the t-tests are both higher than .05 meaning that there is no significant statistical difference between cells with or without CPO grown in RPMI and DMEM.

**Increasing amounts of folate in the presence of CPO does not affect MDCK cell growth.**

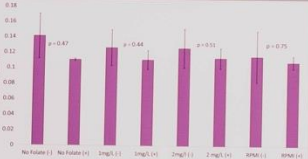


Figure 5: A bar graph illustrating cells with and without CPO, (i) and (ii) respectively, grown in RPMI media with varying concentrations of folate. The error bars show the standard deviation within a sample group. The p-values from the t-tests are above .05, which shows that there is no statistical difference between groups with and without CPO with the same concentration of folate.

### Results

**CPO activity increases as the amount of folate increases**

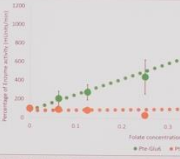


Figure 6: A scatter plot illustrating the percentage of enzyme activity as Glu and Pre-Glu. The error bars show the standard deviation of each sample group. The standard deviation of the Pre-Glu data graph. The dotted lines show the trendline of the data points. T with the same results.

### Conclusion

- There is no significant statistical difference in cell growth without CPO grown in Pre-Glu3 folate.
- This conclusion may be due to the fact that folate interacts with the folate in the media, DMEM and RPMI.
- However, when purified zebrafish CPO was used, it showed that the enzymatic activity of CPO was increased in the presence of folate.
- The data shows that when CPO is in the presence of glutamic acids, Pre-Glu3, versus with less glutamic acids, the enzymatic activity increases.

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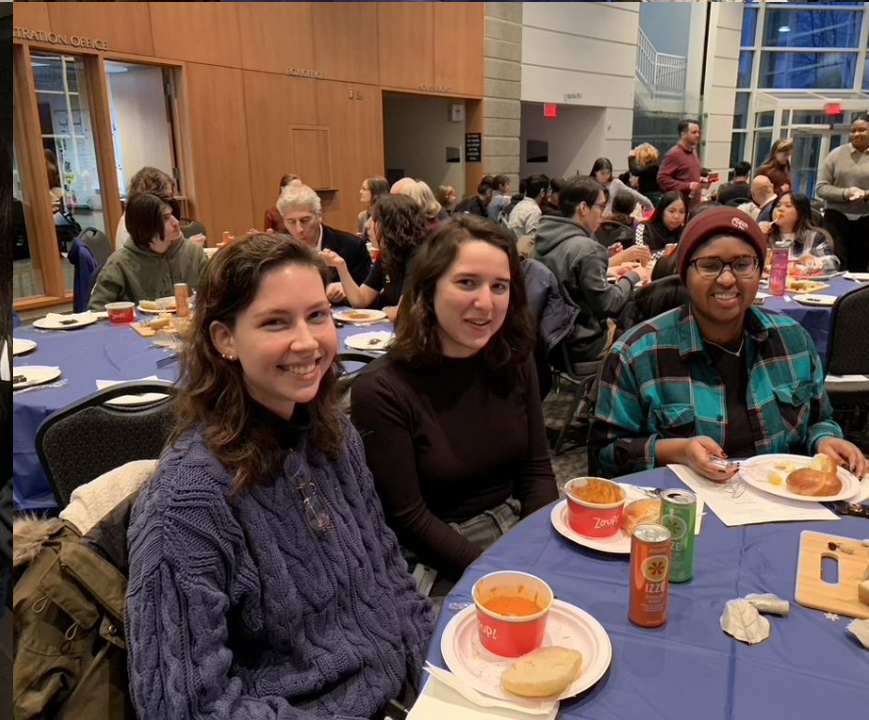


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