Learning to Love Bats

(travel support and professional society memberships)

My current research question is, "Can public education, including bat-related tourism, assist in bat conservation efforts?" Although bats often have a negative image in the public imagination, bats play many vital ecological roles such as pest control, pollination and seed dispersal (Kunz et al., 2011). Several threats have recently emerged that threaten the livelihood of bats. As just one example, White-nose syndrome, a lethal fungal disease that causes bats to prematurely emerge from hibernation, has killed millions of North-American bats since its arrival to the United States in 2007 (Bat Conservation International). Informing the public of these benefits and threats could bring more awareness and positive attitudes towards the taxon.

Many places in the southwestern United States have marketed their urban bat colonies to create areas of ecotourism, such as the Congress Avenue Bridge in Austin, Texas (Taylor & Butler 2007). It is estimated that bat-related tourism generates 6.5 million dollars annually in the southwestern United States (Bagstad & Wiederholt 2013). Wildlife-oriented tourism is one of the fastest growing activities in the United States (Pennisi, Holland, & Stein 2004), and bat-watching destinations could play a positive role in influencing peoples' attitudes and perceptions of bats.

My project will be structured into two main parts. The first part of my project will be a literature review analyzing current literature pertaining to conservation education, bat conservation, bat-related ecotourism, bird-related ecotourism, and human perceptions of bats. This part of my project will require access to academic journals, which I have through the USM library. The second part of my project will be field work researching organizations and places where bat-related conservation education and ecotourism take place. I will look at their conservation strategies and interview people working in these areas on their perceived effectiveness of the strategies. I hypothesize that public education assists bat conservation efforts by educating people on the environmental importance of bats and alleviating negative, historical biases towards the taxon, which currently hinder their conservation. I believe areas of bat-related tourism are the most effective places to distribute educational materials to the public, since these areas involve a stronger, more interactive experience with the taxon.

The field work portion of my project will require me to visit several different places where bat-related conservation education and bat-related ecotourism take place. The places I intend to visit are the Houston Audubon, the Congress Avenue Bridge in Austin, Texas, the Bracken Cave Preserve in San Antonio, Texas, the Pascagoula River Audubon Center, and Mammoth Cave National Park. These are all examples of places where conservation education take place, and the Congress Avenue Bridge and the Bracken Cave Preserve are also examples of bat-related ecotourism destinations. I also will interview people working in these locations, as well as members of the Mississippi Bat Working Group, a group of scholars and enthusiasts focused on

studying bats in Mississippi. I will seek proper IRB approval for this purpose with the help of my adviser. I have already completed my CITI training with the University, as well as the additional Human Subjects Research module.

The ultimate goal of my project is to contribute more knowledge to the field of bat conservation. I believe that my research will provide educators with a comprehensive overview of what other organizations are doing to benefit bat conservation efforts. By researching organizations conducting bat conservation, their methods, and the effect of the various programs, I hope to illuminate which methods of bat conservation are effective or ineffective in influencing human perceptions of bats and ultimately their behaviors towards bats. By doing so, conservation organizations will have a better framework on which to model their conservation education strategies.

The effect of environment and quorum-sensing on the production of phenazines by plant and animal pathogenic *Burkholderia*

(commodities and stipend)

Burkholderia is a ubiquitous group of Gram-negative bacteria that contain numerous saprophytes, nitrogen-fixing mutualists, as well as species that are associated with infectious diseases, hospital-acquired infections and necrotizing pneumonia in individuals with cystic fibrosis (1). These organisms were previously classified as *Pseudomonas*, but the advent of molecular and genetic techniques ultimately identified *Burkholderia* as members of a distinct genus within Betaproteobacteria (2). Three distinct lineages are recognized within the *Burkholderia* group: i) the *B. pseudomallei* clade of mammalian pathogens, ii) the *Burkholderia cepacian* complex (Bcc) of opportunistic pathogens, and iii) the *B.glumae*/*B.gladioli* clade of plant pathogens.

Some species of *Burkholderia* produce colored redox-active secondary metabolites called phenazines (Phz). In other groups of bacteria, phenazines strongly contribute to the competitiveness, formation of biofilms, and virulence in multiple models of infection. Similar depth of knowledge on the diversity, biosynthesis, and biological functions of phenazines in *Burkholderia* is missing. Recent studies in my mentor's lab demonstrated that phenazine gene clusters are present in genomes of multiple *Burkholderia* that have a worldwide origin and belong to different species of the genus. The studies also revealed a link between the presence and amount of phenazines and the biofilm growth in *Burkholderia lata*. The dynamic nature and yield of different phenazine derivatives in *Burkholderia* suggest the complex effect of environment and specific and global regulation, details of which remain entirely unknown. The proposed work will address this important gap in the knowledge and will examine the influence of environmental factors and quorum sensing on the production of phenazines in the opportunistic pathogens of the Bcc group and the rice pathogen *B. glumae.*

I will explore the effect of several environmental factors on the expression of phenazine biosynthesis (*phz*) genes in strains 2424, PC17, and *B. lata* 383, which belong to the Bcc group of opportunistic pathogens. I will also include in this analysis *B. glumae* 411gr-6, which causes the bacterial panicle blight of rice. I will compare the expression of *phz* genes in *Burkholderia* cultured in several different growth media, including the LB, King's medium B, Mueller–Hinton, CPG agar, and SCFM medium (8) that mimics the sputum of cystic fibrosis patients. The

bacteria will be grown at 30°C to the late stationary phase, and total RNA will be extracted using the RNeasy Mini kit, treated with DNase I, and quantified with a NanoDrop spectrophotometer. The induction of the *phz* pathway will be measured by quantitative PCR (qPCR) with primers targeting the *phzA* phenazine biosynthesis gene and normalized against the housekeeping *gyrB* gene. I will also compare the expression level of *phz* genes in KMB at different temperatures (30°C vs. 25°C and 37°C), oxygen levels (21% vs. 15%), growth phase (exponential vs. stationary), and culture conditions (planktonic vs. biofilm). Many pathogens coordinately regulate energetically expensive processes (secretion of virulence factors, motility, biofilm formation) via quorum sensing (QS) (9). QS is a form of cell-cell communication, which involves the production, detection, and response to signaling molecules known as autoinducers. In several groups of bacteria, the expression of *phz* genes is regulated by autoinducers, but the effect of QS on the production of phenazines in *Burkholderia* is unknown. Therefore, I will use qPCR to compare the expression of *phzA* in control cultures and cultures amended with N-acyl homoserine lactones, which are used by *Burkholderia* as intraspecies QS signals (10).

The expected results will provide new insights into the effect of environmental factors and cell-cell communication on the production of phenazines in different clades of *Burkholderia*, which include plant and animal pathogens. These data will contribute to the ongoing collaboration between my mentor's lab and the group of Prof. Wulf Blankenfeldt at the Helmholtz Center for Infection Research in Germany. The goal of that project is to characterize the contribution of phenazine metabolites to the biology of pathogenic members of the genus *Burkholderia*.

Genders' perspectives on affirmative consent

(travel support, participant incentives, commodities)

Our first central question asks if there are any differences in genders' perspectives of giving and receiving sexual consent. Our second question asks how students at USM and LSU feel their university has prepared them to approach consensual sexual relationships (either by freshman/transfer orientations, Greek Life requirements, etc.). The third question asks if there is any difference in the aforementioned variables between a university that has an affirmative consent policy vs. one that does not. With our first study at USM, the data analysis suggested that women were more likely to not agree that USM gave adequate training on consensual sexual relationships during freshman or transfer orientations, whereas men were more likely to agree. This study would like to further ask students how they believe affirmative consent policies should be implemented more effectively within their respective campuses. We hope to record concerns and ideas of students in hopes that USM and other universities can address them.

Our project will use the same research design as our pilot study with a few modifications. We plan on reaching out to fraternities and sororities at USM and LSU for participants. After letters of approval from the Greek Life systems and other organizations, we will submit an IRB modification and wait for approval. Once IRB approval has been granted, we will prepare for the upcoming data collections in the fall. We plan on using an established Sexual Consent Scale from a Trent University professor who has already granted our permission to replicate his survey. This survey will allow for participants to record how they approach giving and receiving sexual consent quantitatively. The second portion of the survey will be qualitative, where participants will be invited to record their thoughts on how universities can more effectively approach sexual assault prevention. Eight participants will be randomly selected to receive a $25

gift cards. Once materials have been collected, the signed informed consent papers will be kept in my mentor's locked office. The data will be entered and analyzed in SPSS.

Uncovering Mexican Repertoire for the Double Bass

(stipend and instrument modification)

Since fall 2018, I have researched Mexican Composers and works featuring the double-bass. Eventually, my resources became limited to internet/academic databases and the Cook/Gulf Coast libraries. When I heard about the DCUR grant program, I got excited that funds are given to research something I'm passionate about —uncovering original Mexican compositions buried inside Mexican conservatories libraries. Summer funding would help me commit to my research instead of obtaining unrelated work.

My first goal involves cataloging pieces by Mexican Composers in chamber music and solo repertoire, as well as transcribe compositions from similar instruments, such as the cello, bassoon, or trombone, which are instruments that share comparable registers and color to the double-bass.

Surprisingly, in my research I have discovered works originally for double-bass, such as Carlos Chavez's "String Quartet number 2," written for violin, viola, cello and double-bass instead of the usual formation of two violins, viola and cello. Often, the double-bass is ignored in string quartets. This will significantly add to double-bass repertoire. My plan involves uncovering more composers who have written similar works.

Uncovering pieces by Mexican Composers significantly impacts future generations of musicians. Important works are forgotten because of the dominating cultural canons, nationalities, or gender of the composers, but after archival research, they become valuable master pieces, important for art and humanity. For example, after Silvestre Revueltas' death in 1940 finally his work became important outside Mexico.

Double-bass students and professionals struggle to find works to perform in chamber recitals, festivals, or solo recitals, pieces created to play outside those of large orchestral performances. To increase options for solo and chamber repertoire, l will research valuable works from non-traditional composers. To diversify normative canon, I hope to illustrate that Mexican composers and musicians have made significant contributions to classical music, even though current canonical teachings show otherwise.

My final goal will answer why Mexican composers, particularly women, are not included in repertoires at both Mexican conservatories and American schools. In performing a chamber recital in November, a solo recital in December, and again at the fall Double-Bass Symposium and the Undergraduate Research Symposium in spring 2020, I will illustrate that Mexicans have and can be of aesthetic value to the predominately European and American canon.

First, I will continue my review of the literature about Mexican composers, cataloging even the smallest mentions of Mexican compositions written at Mexican conservatories. The catalog involves a breakdown of 4 primary periods in music: 1) Early-Baroque (New Spain period), 2) Classical and Romantic period (after Independence period), 3) Nationalist period (after the Mexican Revolution), and 4) the late 20th Century period (Modernism, Mexican Impressionism,

etc.). By cataloging music in this manner, the tradition of music education remains intact, but will be added to by Mexican composers.

For my literature review, internet databases like ProQuest Music Periodicals Database and the expansive collection in the Cook Library have informed much of my early research and my general hypothesis. However, these resources are limited to relatively popularized composers. The most significant section of my plans involves traveling to Mexico visiting four different libraries where the materials currently exist. Many of the works are only accessible as manuscripts in the Biblioteca Candelario Huizar del Conservatorio Nacional de Música in Mexico City as well as the music library at Escuela Superior de Música in Mexico City and the Conservatorio de las Rosas in Morelia.

The second step involves contacting and interviewing important professional musicians and composers in Mexico, who are in Mexico City, Guanajuato and Michoacan, such as Gabriela Ortiz, Marcela Rodriguez, and Mario Lavista, among others. Their insight will inform anecdotally and aesthetically the specific contributions Mexican composers have made in their careers, research integral to understanding Mexican compositions outside that found in libraries. Most importantly, several compositions were written, but not formally published, and these composers and musicians can guide me to finding manuscripts of unpublished pieces.

Third, upon returning to Hattiesburg with the literature, I will assemble, annotate, and analyze the data: chamber works (string quartets and more), solo works, and transcriptions using Sibelius Software. The act of transcribing music is a detailed process, but worthwhile. Sibelius is the most useful and efficient software for scorewriters. After assembling the catalog, I will work everyday to make the catalog accessible to different bass players and musicians by creating an online database using Youtube videos and website hosting services like WIX. Already I have an index of approximately 25 chamber music pieces from Silvestre Revueltas, Carlos Chavez, Gabriela Ortiz, Ana Lara and others.

Transcriptions from other instruments are significant, works that can alter the perception of Mexican chamber music and the double-bass, such as cello sonatas and other instrumentals that share the same register. Unfortunately, Interlibrary Loan and the USM libraries do not have these materials and they are not available in e-formats. However, these can be accessed in the stacks of the Central Library at the Ciudad Universitaria Campus of UNAM and the others mentioned previously. When Francois Rabbath (French composer and double-bass player) transcribed the Bach cello sonatas for double-bass, the works became an important part of bass repertoire, for music education, professional auditions and recitals. My hope is that this work from Mexican composers would become important as well.

Mother Feminism: A Study in Jewish American Literature

(travel support)

My project examines three Jewish American novelists, Abraham Cahan, Anzia Yezierska, and Grace Paley. I first read these writers in my mentor's Jewish American Literature course. After reading them, I realized that they each portrayed a recurring type of character: a Jewish woman who, as a mother, also demonstrates a strong allegiance to feminism. I have turned that insight into a research project that explores what I call, "Mother Feminism." This is a paradoxical type because while as traditional mother this character type appears subservient to men, in fact, her

every choice regarding childrearing is rooted in a fundamental desire to bring equality into the world for posterity. For the Eagle Spur Award, I focus solely on Paley, an author famous for her progressive, if not controversial, short stories about Jewish women. Because I plan to make a case for Paley's "mother feminism" in my project, I need to examine the extensive collection of Grace Paley manuscripts and letters held at the Harry Ransom Research Library at the University of Texas at Austin. With an Eagle Spur Award I will be able to analyze this abundance of sources. Ideally, they will allow me to demonstrate the nuances of what I am calling her "mother feminism."

The three writers I examine create characters that have much in common: the recurring character Faith in Grace Paley's short stories, the characters Sara and Bessie Smolinksy in Bread Givers by Anzia Yezierska, and the character Dora in Abraham Cahan's The Rise of David Levinsky each represent a familiar cultural type, "the Jewish mother" (Antler xvii). Stereotypes illustrate the Jewish mother as "excessive, overprotective, neurotically anxious, and ever-present" (Antler xvii). This stereotype defines the Jewish mother as a woman who has succumbed to the patriarchal requirements of her religion, and thus finds her sole purpose in life in her role of motherhood. Yet I argue that these writers critique this type and show it to be a paradox. Though each of the women in these novels does willingly accept her role as wife, mother, and housekeeper while abandoning her own personal goals, she also uses her vantage point as a mother to fight for a world of individual and gender equality. While as seemingly traditional mothers they seem to care little about any kind of feminist agenda or equality, as "mother feminists" I argue, they manifest their personal feminist agendas in the way they raise their children. Every choice they make regarding childrearing is rooted in a fundamental desire to bring equality into the world for posterity. In my research so far, I have discovered that Jewish mothers are "marginalized in the Jewish tradition" as understood by orthodox standards and that they are measured solely through the care they give to their husband and family (Oppenheim 216). In traditional Jewish culture, the religion mandates that women drop their personal aspirations to assume the responsibilities of motherhood. Traditional Jewish women are expected to keep house and raise children; furthering education and developing a career are highly discouraged as these tasks may distract from their more important domestic duties. Though they are all chained to the occupation of motherhood, not every Jewish mother is thrilled by the prospect of spending her remaining years in the domestic sphere. Because motherhood itself is not always a fulfilling task, the Jewish mother searches for "self-fulfillment" in other outlets, specifically in creating her own feminist agenda in accord with the requirements of motherhood (Adler 28). The traditionally overprotective and overzealous nature of Jewish mothers that gives them the reputation of "living vicariously through their children" is only one of the ways that this feminist train of thought manifests itself (Adler 29). It is all the more necessary, I argue, that these three Jewish American writers make a case from within their own tradition for a specific brand of feminism. For example, while almost every scholar agrees that Sara in Bread Givers is a devout feminist, some scholars argue that, despite her best efforts, the patriarchy still prevails at the end of the novel. One need not enter this debate at all since the concept, "mother feminism" challenges both sides of the debate and in so doing, changes the premise. The question asks not which character is a feminist, but how each character brings their feminist agendas to fruition through action.

The process for this project, which has already begun, involves mostly computer research within scholarly databases. It is important, as an English scholar, to have a thorough understanding of the arguments other scholars have presented about the works in question. For example, while

almost every scholar agrees that Sara in Bread Givers is a devout feminist, some scholars argue that, despite her best efforts, the patriarchy still prevails at the end of the novel. All opinions regarding the story are relevant and helpful in this kind of research. While it is important to know what scholars have said about certain literary works, to understand the author's mindset while writing a piece is key in translating the message they intent to portray. Grace Paley's short story manuscripts are located in the Harry Ransom Center at the University of Texas at Austin, and each manuscript is complete with her own hand-written revisions in the margins. By browsing these manuscripts with Paley's notes, I hope to discover her train of thought as she worked to compose her short stories. Paley was an adamant civil rights activist as well as an artful writer, so I believe her notes will reflect her double purpose of both expressing her political views as well as her process of refining her rhetoric will be very useful to me. By delving into the mindset of Paley, who originally inspired my thoughts about mother feminism in the first place, I hope to gain even more insight regarding the theme of mother feminism as a whole, and also learn ways to apply it to the other texts that I will be evaluating during this project.

Though there are many scholarly articles written about motherhood, and many written about feminism, there are few that reconcile the two. By researching the feminist behaviors of mother figures in Jewish literature, I hope to add to the pool of existing scholarship about the novels that I will be evaluating in a way that is innovative and new. By combining the idea of feminism and motherhood, I hope to create a new space in which to talk about the two. In so doing, I want to acknowledge that the two are not mutually exclusive institutions. I hope to publish this article in an academic journal.

Formation of Micron-Size-Patterned Polymer Film Using Electric Field

(commodities and travel)

The purpose of this research is to form micron-size-patterned conjugated polymer thin films without using costly lithography processing steps. After forming P3HT nanowires in solution, DC electric field will be utilized to deposit them towards the cathode, and then the patterned deposition will be solvent-annealed to turn it into a patterned thin film. The first scientific question for this project is the net positive charge observed on the P3HT nanowires.[2] This formation of charge is still unknown, and it also raises another question: does the net positive charge on the nanowires induce a net negative charge somewhere within the P3HT solution? When performing this research, we plan on studying the causations of this net positive charge on the nanowires, such as light irradiation, air exposure, temperature, solvent property, and polymer-solvent interactions within the solution. Understanding this phenomenon could also provide insights for determining the complex formation of P3HT nanowires.

The practical objective of this project is to provide manufacturers with another option for patterning microchips or other substrates with polymers without having to be burdened by the costs of using photolithography.

We will start this project by obtaining a P3HT solution and letting it self-aggregate to form the positively charged nanowires. A few factors that could influence the P3HT aggregation and possibly net charge formation process will be explored: light irradiation, air exposure, temperature, solvent property, external electric field, and polymer-solvent interactions. The

magnitude of net charge formation will be tested in a DC field based on the size and formation rate of the depletion zone. This nanowire solution will then be deposited onto either a glass or ceramic substrate that has at least two electrodes (one cathode and one anode) under a DC electric field. Solvent vapor annealing will then be used to transform the deposited nanowires into a thin film, thus forming a specific pattern. From here, optical and fluorescence imaging will be performed to better understand the aggregation process of P3HT. Atomic Force Microscopy (AFM) will also be performed to investigate the nanowire pattern and any other morphological phenomenon before and after solvent vapor annealing. Furthermore, we would like to try to transport the patterned nanowires onto another substrate by either dewetting it via water or by using a polydimethylsiloxane (PDMS) stamp. When using the dewetting technique, the sample substrate will be submerged in water so that its surface tension can be utilized to break off the nanowire thin film from the underneath substrate. This thin film can then be collected and transported onto another substrate. The other technique will use PDMS to adhere to the micron-sized-patterned thin film. After the PDMS collects the thin film, the patterned film can then be "stamped" onto another substrate.

We have already obtained some preliminary data on this subject matter. From the images attached, it can be seen that a ceramic substrate with gold electrodes was used for the selective deposition of P3HT nanowires. The dark spots located in the substrate represent the deposited P3HT nanowires. It can also be seen that these nanowires are mainly located within the cathode region. This example provides the proof-of-concept experiment that it is feasible to selectively deposit the nanowires onto a given electrode (cathode). With the help from this grant, we will be able to move further along in this research in regard to performing certain characterizations and also utilizing the transport techniques mentioned to deposit the film onto another substrate, which will greatly benefit those who need a patterned substrate but cannot afford the cost of using photolithography.