*27th Annual*

# Student Research Forum

April 13 and 20, 2018

Centenary

# *27th Annual* Student Research Forum

## April 13 and 20, 2018

### Posters
Mickle Hall
(2nd floor)
2:00 – 5:30 P.M.
April 13, 2018

### Social Sciences
Carlile Auditorium
(Mickle Hall first floor)
2:00 – 2:30 P.M.
April 20, 2018

### Humanities
Carlile Auditorium
(Mickle Hall first floor)
2:30 – 3:10 P.M.
April 20, 2018

### Natural Sciences
Carlile Auditorium
(Mickle Hall first floor)
3:20 – 4:00 P.M.
April 20, 2018

# *27th Annual* Student Research Forum

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DOUGLAS F. AND MARION S. ATTAWAY FOUNDATION

## JUDGES

DR. DAVID BIELER ..... *Associate Professor of Geology*
MR. DON HOOPER ..... *Professor Theatre and Dance*
DR. JOSHUA LAWRENCE ..... *Associate Professor of Chemistry*
DR. REBECCA MURPHY ..... *Assistant Professor of Biology*
DR. JARRET RICHARDSON ..... *Assistant Professor of Neuroscience*
DR. KYLE RISTIG ..... *Assistant Professor of Management*
DR. MICHELLE WOLKOMIR ..... *Professor of Sociology*
DR. JEFFERY EVANS ..... *ULM Associate Professor*
DR. LUCY ROBINSON ..... *LSUHSC Associate Professor, Biochemistry & Molecular Biology*

## DIRECTOR

DR. SCOTT CHIRHART
*27th Annual Student Research Forum*

# POSTER PRESENTATIONS/ JUDGING

* Presentation and judging will take place on Friday, April 13th between 2:00 P.M.-5:30 P.M. on the second floor of Mickle Hall. In preparation for the judging, presenters should have their posters in place and ready at their assigned locations no later than Thursday evening.

| | | |
|---|---|---|
| 2:00 P.M. | Provost Jenifer Ward | Introduction/Welcome |
| 2:15 P.M. | Jacob Gingles | Physics/Geology |
| 2:30 P.M. | Zachary Harrison | Geology |
| 2:45 P.M. | Kaleb Kirk | Geology |
| 3:00 P.M. | Jessica Truong | Biology |
| 3:15 P.M. | Mason Kay | Chemistry |
| 3:30 P.M. | Will McLean and Harrison Folse | Chemistry |
| 3:45 P.M. | Colton Toups | Biology |
| 4:00 P.M. | Fatima Iqbal | Biology |
| 4:15 P.M. | Toni Ficarra and Amanda Farr | Psychology |
| 4:30 P.M. | Ian Graham | Business |
| 4:45 P.M. | Kaleb Behm | Business |
| 5:00 P.M. | D.J. Britten | Business |
| 5:15 P.M. | Michael Francis II | Business |

# ORAL PRESENTATIONS/ JUDGING

* Presentation and judging will take place on Friday, April 20th between 2:00 P.M.-4:30 P.M. in Carlile Auditorium which is located in Mickle 114.

## SOCIAL SCIENCE

in Carlile Auditorium

2:00 P.M. Provost Jenifer Ward .....Introduction/Welcome
2:10 P.M. Brooks Williams ..... Economics
2:20 P.M. Garrett Peters..... Economics
* Social Sciences Oral Presentations end about 2:30 P.M.*

## HUMANITIES

in Carlile Auditorium

2:30 P.M. Gage Dabin..... History and Political Science
2:40 P.M. Gage Dabin..... English
2:50 P.M. David Westbrook ..... Music and Philosophy
3:00 P.M. Alex Shannon ..... Music
* Humanities Oral Presentations end about 3:10 P.M.*

Break: 3:10 P.M. – 3:20 P.M

## NATURAL SCIENCES

in Carlile Auditorium

3:20 P.M. Lydia Grafton .....Biology
3:30 P.M. Kaity Mussio.....Chemistry
3:40 P.M. Aakriti Bhandari .....Biology
3:50 P.M. Rebekah Frazier .....Biology
* Natural Sciences Oral Presentations end about 4:00 P.M.*

# POSTER PRESENTATIONS

## Electro-optical and Birefringence Properties of 5CB Nematic Liquid Crystal

Jacob Gingles

Research Advisor: Dr. Chandra Pokhrel
Department of Physics/Geology
Centenary College of Louisiana

We have measured the birefringence properties and the effect of electric field on the optical transmission of 5CB (4'-pentyl-4-cyanobiphenyl) liquid crystal. The birefringence was calculated by measuring the transmitted light intensity from the 5CB sample with planar alignment placed between two cross polarizers as a function of director angle. The signal maxima were obtained when the sample director is 45° with the polarization axis of the laser and with the analyzer axis, and minima were obtained when the director is either parallel to the polarizer or to the analyzer. The electric field response of the 5CB liquid crystal was measured by measuring polarized light transmission through a twisted nematic 5CB cell placed between cross polarizers. The 90% transmission occurred when the electric field was 4.7 MV/m.

## Petrology of the Beaver Dam Amphibolite, Eastern Blue Ridge, Alabama

Zachary Harrison

Research Advisor: Dr. David Bieler
Department of Geology
Centenary College of Louisiana

The Beaver Dam amphibolite occurs as several exposures of metamorphosed mafic rocks in the Ashland-Wedowee belt in the Eastern Blue Ridge of Eastern Alabama. The exact stratigraphic position of these exposures is unclear and this research cannot resolve that question, but we can determine the character of the parent rock and clarify the differences in metamorphism. Trace element geochemistry shows the rocks from the three outcrops have the same protolith and are consistent with interpretations that the parent basalts originated in a rifting environment. Major element analyses (in progress) will clarify these relationships and strengthen our interpretations.

The rocks have complex structural and metamorphic histories. Samples from Beaver Dam Creek are well foliated, schistose to gneissic rocks composed of quartz, plagioclase, epidote, and hornblende. The hornblende is pleochroic, green to light brown. Occasional grains of relict pyroxene from the original basalt are present. This likely represents the earliest phase of metamorphism in the rocks. Samples from the Cornhouse antiform are amphibole schists to phyllites formed as the amphibolites were sheared and metamorphosed a second time under lower temperature conditions producing blue-green amphiboles and chlorite.

## Petrology and Geochemistry of a Mitchell Dam Amphibolite Core, Chilton County, Alabama

Kaleb Kirk

Research Advisor: Dr. David Bieler
Department of Geology
Centenary College of Louisiana

The Mitchell Dam Amphibolite is the southwesternmost of a series of amphibolite bodies in the Eastern Blue Ridge of central east Alabama. Several studies have reported some geochemical and geochronologic data, but no systematic data on a continuous section has been available.

Two test cores taken where Mitchell Dam was constructed yielded a section about 138 feet thick with 21.5 feet missing between the two cores. The lower 98 feet are massive hornblende-plagioclase amphibolite. The upper 40 feet include a cataclastic metasedimentary unit and a carbonate rich transition zone. Metamorphic mineral assemblages in the rocks are typical of amphibolite facies metamorphism.

In this study, 65 samples were taken with an average spacing of 1.7 feet (range from .5 to 7 feet) to build profiles to show chemical variation throughout the core and determine the protolith of the amphibolites. Whole rock and trace element geochemistry suggests a tholeiitic protolith, most likely generated in a mid ocean ridge or back arc basin setting.

## *Helicobacter pylori* Survivability after Exposure to Microgravity

Jessica Truong

Research Advisor: Dr. David McGee
Department of Microbiology and Immunology, Louisiana State University Health Sciences Center, Shreveport, LA

Around 50% of the world's population is estimated to be infected with *Helicobacter pylori,* a bacterium responsible for most cases of gastritis. When exposed to microgravity, astronauts commonly report experiencing gastritis. Human bacterial pathogens face challenges upon host cell interactions including reactive oxygen species, osmotic, heat, acid, and bile salt stresses. Environmental signals trigger bacterial responses leading to either increased susceptibility or increased resistance to environmental stress. *Helicobacter pylori,* with many stress resistance mechanisms and links to gastritis, has not been studied for its responses to microgravity. *H. pylori* was cultured in chemically-defined medium and then subjected to normal gravity or microgravity conditions using high-aspect ratio vessels (HARVs). The two types of cultures with similar bacterial viability were then subjected to the same type of stress. Over the span of the experimentation, reactive oxygen species, osmotic, heat, acid, and bile salt were the types of stress tested. For high salt stress, there was no difference in killing. For bile salt deoxycholate, hydrogen peroxide, heat of 42°C, and pH 4 acid, the microgravity cultures survived better than the normal gravity cultures. The data suggests *H. pylori* senses microgravity as an environmental cue, which triggers resistance to several types of stress.

## Characterization of the effects of ebselen on *C. elegans* aging, development, and stress resistance

Mason Kay

Research Advisor: Dr. Katherine Weeks
Department of Chemistry
Centenary College of Louisiana

Ebselen is an organoselenium compound that simulates the endogenous antioxidant glutathione. Due to ebselen's potent antioxidant activity, we hypothesized that it may have biological activity in preventing the onset of aging phenotypes and possibly extending lifespan. To study the effect of ebselen on organismal

lifespan and aging phenotypes, we chronically exposed the model organism *C. elegans* to increasing concentrations of ebselen and measured developmental rates, lifespan, and its effects on egg laying. We also scored the worms' locomotion and ability to survive oxidative stress when pre-treated with ebselen. Ebselen extended lifespan of *C. elegans* in a dose-dependent manner, slowed development, and delayed the onset of egg-laying. Interestingly, with the doses tested, ebselen reduces the number of viable offspring produced by treated animals. Ebselen also increased youthful locomotion in aged worms chronically exposed to the drug and has a robust protective effect against oxidative stress.

## Deducing the mechanism by which deprenyl increases lifespan in *C. elegans*

Will McLean and Harrison Folse

Research Advisor: Dr. Katherine Weeks
Department of Chemistry
Centenary College of Louisiana

Deprenyl (Selegiline) inhibits monoamine oxidase B (MAO-B), an endogenous enzyme that breaks down dopamine. As a result, an excess of dopamine is present in patients taking this drug, which helps treat the symptoms of Parkinson's disease. Interestingly, published studies indicate that deprenyl increases lifespan in rats (Astle and Harrison, 1996), though the mechanism is unknown. In order to determine the mechanism by which deprenyl extends lifespan, our lab has turned to the tractable model organism *C. elegans*. Deprenyl has recently been shown to prevent dopamine metabolism in *C. elegans* (Schumacher, 2015), and our lab has demonstrated that 0.10 mM deprenyl has a wide range of effects on N2 animals. It delays development and the onset of reproduction, but does not inhibit reproduction or the number of viable offspring. Deprenyl has been shown to increase the median lifespan of N2 worms by 15% and maximum lifespan by 13%. In the lab, it has been seen that deprenyl does not inhibit pharyngeal pumping and reduces age-induced paralysis in the animals. To deduce the mechanism by which deprenyl has these effects, *C. elegans* deficient in CAT-2, an enzyme used to synthesize dopamine, and the lifespan-regulating transcription factor DAF-16 were treated with deprenyl, and their phenotypes were scored. Deprenyl slows the development of cat-2 worms and extends their lifespan, but

does not consistently affect developmental rate or lifespan of daf-16 worms. Deprenyl shows a protective effect against oxidative stress in both cat-2 and daf-16 worms. Interestingly, at the effective doses, deprenyl did not induce nuclear localization of GFP-tagged DAF-16 (DAF-16::GFP).

## Interaction of Neuroprotective Effects of Human Placental Mesenchymal stem cells and Endothelin Receptors

Colton Toups

Research Advisors: Dr. Steven Alexander, Dr. Wang, Mansoureh Barzegar, Sergio Cananzi, and Shripa Amatya
Department of Molecular and Cellular Physiology,
Louisiana State University Health Sciences Center, Shreveport, LA

Human placental mesenchymal stem cells (HPMSC) exert protective effects on blood flow maintenance in the cerebrum after stroke. HPMSC's maintain and restore normal neurologic function, however it is currently unknown what (mechanism) underlies this protective effect. Stem cell based protection is believed to involve interactions between HPMSC and brain vascular smooth muscle cells (SMC). Inappropriate relaxation of vascular smooth muscle leads to failures of autoregulation in the brain which is needed to support normal cerebral metabolism. Our previous studies show that an endothelin converting enzyme (ECE) inhibitor eliminated the protective effect of HPMSCs in a model of brain vascular smooth muscle contraction. Therefore an endothelin appears to be involved, but it is not yet known which Endothelin receptor, A or B (ETA, ETB), is responsible for protective interactions. ETA and ETB are inhibited by Bosentan (Tracleer) at concentrations of 4.7-6.5 nM $K_i$ for ETA, and 6.5 nM-343 nM $K_i$ for ETB. A concentration assay will be run using Bosentan hydrate at the low and high concentration to determine whether ETA or ETB were individually or cumulatively responsible for the protective interaction. This study aims to determine the involvement of endothelin receptor subtypes to help elucidate the neuroprotective effect of HPSMSCs.

## Provisional Matrix-binding Integrins in Atherosclerotic Proinflammatory Gene Expression

Fatima Iqbal

Research Advisors: Dr. Wayne Orr and Jonette Green
Department of Pathology, Louisiana State University Health Sciences Center, Shreveport, LA

During atherosclerosis, endothelial cells show enhanced expression of proinflammatory genes ICAM-1 and VCAM-1, a process known as endothelial cell activation. ICAM-1 and VCAM-1 contribute to atherosclerotic plaque formation. Stimuli that are known to induce endothelial activation include oxidized LDL(oxLDL), cytokines and the bacterial endotoxin LPS. Regulating endothelial cell activation are the integrins $\alpha v\beta 3$, $\alpha v\beta 5$ and $\alpha 5\beta 1$ which bind to the provisional matrix protein fibronectin. Previous studies have shown that blocking signaling by these integrins has led to decreased level of ICAM-1 and VCAM-1 in response to ox-LDL. Here, we tried to determine if knocking out these integrins also led to decreased expression of ICAM-1 and VCAM-1 in response to cytokines and LPS. Murine aortic endothelial cells were isolated from integrin $\alpha 5^{f/f}$, $\alpha V^{f/f}$ mice and were transfected with either adeno-CRE virus to produce double-knockout cells or adeno-GFP virus to produce wild-type cells. Both cell types were then treated with stimuli. Our results from qRT-PCR show that double-knockout cells do express lower levels of ICAM-1 and VCAM-1 as compared to wild-type cells in response to oxLDL. However, it was found that VCAM-1 and ICAM-1 expression was unaltered in double-knock out cells as compared to wild-type cells in response to cytokines and LPS, suggesting that expression of ICAM-1 and VCAM-1 by these stimuli is independent of $\alpha 5/\alpha V$ signaling.

## Memory for Accented Speech and Depth of Processing during Encoding

Toni Ficarra[1], Amanda Farr[1], and Sarah T. Irons[2]

Research Advisor: Dr. Jessica Alexander
[1]Department of Psychology Centenary College of Louisiana
[2]Department of Psychology, Rice University, Houston, TX

The present study examined memory for accented speech based on depth of processing at encoding. Previous research has found that accent may serve as a desirable difficulty for

memory, but other studies show that it may impair memory for semantic information. In the first experiment, listeners heard single words from native English speakers and completed three tasks, a surface/shallow task (identifying speaker gender), an acoustic/rhyming task, and a semantic/sentence completion task. Recognition memory was compared across the tasks. In the second experiment, listeners heard words from both native English speakers and Spanish-accented speakers across all three tasks. These results have implications for understanding memory for accented speech as well as for how we reconcile ideas of desirable difficulties in information processing with our understanding of depth of processing during encoding.

## S.M.I.F. 2017 Alternative Investments and Fixed Income Returns

Ian Graham

Research Advisor: Dr. Barbara Davis
The Frost School of Business
Centenary College of Louisiana

The purpose of this presentation is to report the year-to-date investment returns for the Centenary College Student Managed Investment Fund (SMIF) for 2017. As a student in Finance 460, course requirements include research and analysis of investment for the SMIF, similar to a professional portfolio manager. The specific categories displayed on this poster are the Alternative investments and fixed income segments of the portfolio. Mutual fund and exchange-traded fund returns are displayed with their benchmarks to determine any tracking error. Portfolio composition by segment is presented to highlight asset allocation.

## S.M.I.F. 2017 International Investment Returns

Kaleb Behm

Research Advisor: Dr. Barbara Davis
The Frost School of Business
Centenary College of Louisiana

The purpose of this presentation is to report the year-to-date investment returns for the Centenary College Student Managed Investment Fund (S.M.I.F.) for 2017. As a student in Finance 460, course requirements include research and analysis of

investments for the S.M.I.F., similar to a professional portfolio manager. The specific category displayed on this poster is International segment of the portfolio. Mutual fund and exchange traded fund returns are displayed with their benchmarks to determine any tracking error. Portfolio composition by segment is presented to highlight asset allocation.

## SMIF 2017: Mid to Small Cap Investment Returns

D.J. Britten

Research Advisor: Dr. Barbara Davis
The Frost School of Business
Centenary College of Louisiana

The purpose of this presentation is to report the year-to-date investment returns for the Centenary College Student Managed Investment Fund (SMIF) for 2017. As a student in Finance 460, course requirements include research and analysis of investments for the SMIF, similar to a professional portfolio manager. The specific category displayed on this poster is the mid to small capitalization segment of the portfolio. Mutual fund and exchange-traded fund returns are shown with their benchmarks to determine any tracking errors. Portfolio composition by segment is presented to highlight asset allocation.

## S.M.I.F. 2017 Large Cap Investment Returns

Michael Francis II

Research Advisor: Dr. Barbara Davis
The Frost School of Business
Centenary College of Louisiana

The purpose of this presentation is to report the year-to-date investment returns for the Centenary College Student Managed Investment Fund (SMIF) for 2017. The specific category displayed on this poster is the large capitalization segment of the portfolio. Mutual fund and exchange-traded fund returns are displayed with their benchmark to determine any tracking error. Portfolio composition by segment is presented to highlight asset allocation. As a student in Finance 460, course requirements include research and analysis of investments for the SMIF, similar to a professional portfolio manager.

# SOCIAL SCIENCE ORAL PRESENTATIONS

## Determinants of Wine Sales in the Greater Dallas Area: The Relevancy of Wine Ratings

Brooks Williams

Research Advisor: Dr. Betsy Rankin
The Frost School of Business
Centenary College of Louisiana

This study examines the determinants of wine sales in the greater Dallas area. Based on economic theory and previous literature, I regress using four OLS Linear models to understand total units sold using the average price, wine rating from Wine Enthusiast, and a domestic dummy. The data is a random sample of wines in three different price ranges: Lower, Mid, and Higher. The research question is, what are the determinants of wine retail sales in Dallas and do these consumers pay attention to wine ratings, or is it unimportant to the consumer? I gather my data of wine sales from an annual IRI report starting in August 2016 to August 2017. The four regressions run are Overall, Lower, Mid, and Higher priced wines. The Lower ranged wines vary from $1 to $12. The Mid ranged wines go from $12.01 to $50. The Higher ranged wines are anything above $50. The results suggest that all variables are insignificant except for average price, which was also the expected sign. The insignificance of wine ratings may suggest that wine consumers do not see wine ratings as relevant, but buy wines because of other qualitative factors. Further research is necessary to fully understand this concept.

## Effect of Demographic Characteristics Effects on Music Album Sales

Garrett Peters

Research Advisor: Dr. Betsy Rankin
The Frost School of Business
Centenary College of Louisiana

Music is in everyone's lives. We listen to it, we buy recordings of it, we travel to see live performances of it. This project looks at music album sales and what determines them by looking at different demographic characteristics such as median income, education attainment, crime rate in the area, and others. With

these I will determine what demographic characteristics effect music album sales for 4 different genres: rock, jazz, classical, and country. I will be running regressions to determine which characteristics effect music album sales the most.

# HUMANITIES ORAL PRESENTATIONS

### Franchising Terrorism

Gage Dabin

Department of History and Political Science
Centenary College of Louisiana

In today's international environment, terrorist groups have become more prevalent as they have been successful in utilizing terrorism as a powerful political tool. The terrorist groups in the Middle East and North Africa vary in their particular goals from establishing a new caliphate to redirecting the control of certain natural resources. For my research, I investigated African states that contained terrorist groups to see if these states contained common traits and if there was a correlation between these traits and the development of the domestic terrorist groups. With this information, I compared my results with African states that currently had no terrorist groups, and that existed in the same regions of the states with terrorist groups to see if there existed the potential for the terrorist cells to become present within the terrorism free state. From my research I concluded that using socio-economic approaches e.g. investment in schools, investing in local economies, most effectively combats current and prevents future development of domestic terrorist organizations.

### Shadows of Saint-Ybars

Gage Dabin

Department of English
Centenary College of Louisiana

Alfred Mercier's *Saint Ybars* (1888) highlights the patriarchal cultures that existed both on plantations and within cities of south Louisiana during the antebellum through reconstruction eras. My particular interest is in power dynamics in relationships and the aspect of suicide. Mercier's novel is populated with women from a variety of socioeconomic classes from the enslaved

to the elites. I use theories from feminism to gender studies to abolitionist works to express the lack of female agency in different socioeconomic conditions and the disturbing frequency of suicide in the novel.

## Ya Like Jazz?: An Exploration into the Ontology of Jazz as a "Work of Art"

David Westbrook

Department of Music and Philosophy
Centenary College of Louisiana

What does it mean to give an authentic performance of a composition? This is one of the many questions musical ontologists set out to answer. Musical ontology as defined by the Stanford Encyclopedia of Philosophy is "the study of the kinds of musical things that are and the relations that hold between them." The problem in question is important in the classical world, where ideas like the need of an actual harpsichord vs. a synthesized harpsichord for a Bach piece flourish. Jazz, on the other hand, has several distinctions from classical music and with it proves more difficult to flesh out a true ontology. An example of this is as broad of a problem as defining what a piece even is. Miles Davis's *'Round Midnight* and Thelonious Monk's *'Round Midnight* are completely different pieces, yet the thematic core is the same. This paper will identify four possibilities for a jazz ontology in an attempt to find "the work of art" in jazz. I will examine jazz as a tradition of works for performance, jazz performances as works, jazz recordings as works, and jazz as an art without works.

## Uniform Triadic Transformations: Their Origin, Application in Tonal Music, and Relevance in an Atonal Setting

Alex Shannon

Research Advisors: Dr. David Hobson '98 and Dr. Gale Odom
Department of Music
Centenary College of Louisiana

A prominent German music theorist, Hugo Riemann was a significant contributor to the theory of harmony. His legacy has helped shape the theory behind tonal music; one such inspired innovation is the idea of Uniform Triadic Transformations (UTTs). UTTs are certain functions from the set of consonant triads to

itself. They form a group with interesting algebraic properties. Theorists typically use them to analyze transformations between major and minor triads, but Julian Hook observes that they also can be useful in the context of arbitrary sets of pitch classes. This presentation will give necessary background information on these functions, a brief survey of examples found from the Common Practice Period (c. 1600-1910), and a discussion on their application to atonal music. Specifically, we will examine two tone rows (one written by Anton Webern and the other by Milton Babbitt) and show examples of UTTs acting on them.

# NATURAL SCIENCE ORAL PRESENTATIONS

## Microgravity Environment Influences *Helicobacter pylori* Resistance to Stress

Lydia Grafton

Research Advisor: Dr. David McGee
Department of Microbiology and Immunology, Louisiana State University Health Sciences Center, Shreveport, LA

Bacterial pathogens face formidable challenges upon host cell interactions including reactive oxygen species, osmotic, heat, acid, and bile salt stresses. Environmental cues trigger bacterial responses leading to either increased susceptibility or resistance. One poorly studied environmental cue is microgravity which may alter the response of microflora bacteria to stressful conditions. The human gastric pathogen *Helicobacter pylori* has not previously been examined for responses to stresses under microgravity conditions yet possesses abundant stress resistance mechanisms. *H. pylori* was cultured in chemically-defined medium under normal and microgravity conditions and the bacteria subjected to various stresses. Bacterial viability was similar between cultures prior to stress treatments as determined by ATP assays and viable count data. No difference in killing was observed between the two gravity conditions under high salt stress. However, *H. pylori* experienced enhanced survival when cultured under microgravity conditions than when cultured under normal gravity conditions after exposure to stressful conditions such as: the bile salt deoxycholate, heat (42°C), hydrogen peroxide, and acidic pH 4. The overall data suggests *H. pylori* senses microgravity as an environmental cue which triggers resistance to several kinds of stress

## Improved Protein Separations using Ionic Liquid Surfactants

Kaity Mussio

Research Advisors: Drs. Rocio Perez, Punprabhashi Vidanapathirana, Farhana Hasan, and Isiah Warner
Department of Chemistry, Louisiana State University, Baton Rouge, LA

Surfactants are important at each step of the proteomic workflow. Polyacrylamide gel electrophoresis (PAGE), a commonly used technique for protein separation, is assisted by surfactants, which denature proteins making them more suitable for separation. CTAB (cetyltrimethylammonium bromide) is a conventionally used cationic surfactant in cationic PAGE (the first dimension of 2D PAGE). However, this cationic surfactant introduces challenges, including its low solubility and the unsatisfactory resolution of protein bands in CTAB-PAGE. Therefore we have synthesized cationic ionic liquid surfactants (ILS), which were employed for optimized protein separation results. Different concentrations of ionic liquids were used and optimized in this study in the sample buffer, running buffer, and gel. A major finding of this study is that the glycoprotein separations using ILS-PAGE gave preferable appearance of protein bands as compared to CTAB separations. These results suggest that IL surfactants may replace CTAB as the preferred surfactant for cationic PAGE glycoprotein separations. However, the PAGE technique involves a lengthy preparation process and thus is time and cost consuming. We employed another technique for protein separation: Aqueous Two-Phase Systems (ATPS). Using two-phase systems of polyethylene glycol (PEG) and potassium phosphate buffer pH=7, with added IL surfactant as a cosolute, we successfully separated hemoglobin.

## CRISPR-Cas 9 Mediated Gene Editing Technique to Target Copy Number Variants (CNV) Associated with Neurodevelopmental Disorders

Aakriti Bhandari

Research Advisors: Drs. Xio-Hong Lu and Xinli Tain
Department of Pharmacology, Toxicology, and Neuroscience,
Louisiana State University Health Sciences Center,
Shreveport, LA

Several large genome wide association studies have shown that duplication of VIPR2 gene, that encodes GPCR (VPAC2) coupled to cAMP signaling and is expressed throughout the brain, increases the risk of schizophrenia. A human VIPR2 CNV BAC transgenic mouse model with allele associated with schizophrenia was recently developed, and a CRISPR tool was designed to delete all the micro duplicated human VIPR2 genomic regions in the transgenic mice using sequence-specific gRNA. Adeno-associated virus (AAV)-PHP.B was used to deliver this system to the brain because of its high penetrance. The main goal of this experiment was to use Golgi staining methods to characterize transgenic mice with human VIPR2 genes based on the difference in dendritic spines, whose altered distribution and morphology is associated with numerous brain disorders, and to develop a therapeutic strategy that will provide for long-term remediation of CNV-related neurodevelopmental deficits, including schizophrenia, using new genome editing tool, CRISPR.

## Shedding Light on Floral Regulation in Maize

Rebekah Frazier

Research Advisors: Drs. Daryl T. Morishige[2], John E. Mullet[2], Rebecca L. Murphy[1]
[1]Department of Biology Centenary College of Louisiana and [2]Department of Biochemistry and Biophysics, Texas A&M University, College Station, TX

The domestication of maize began around 9,000 years ago by indigenous farmers in Mexico. As cultivation spread north to more temperate environments, plants were selected for decreased photoperiod sensitivity, and today's commercial lines are now very nearly day neutral. Present day maize now feeds millions globally, making it one of the most agriculturally important crops in the world. Because the precise timing of maturation is so intricately linked to grain yield and quality, understanding the regulation of this pathway has become central in the accelerated improvement of maize as we anticipate the demands the ever-increasing world population will have on this globally important crop. Though several genes have been identified that affect photoperiodic flowering in maize, the understanding of floral regulation in this species is far from complete. Here we characterize alleles of several putative floral regulatory genes in tropical and temperate lines, and analyze the photoperiod response of these genes in long and short day conditions to gain understanding about their role in flowering.

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