LSAMP Inspire Program

2018-19

ANNUAL CONFERENCE

Navigating Pathways for STEM Student Success

FEBRUARY 1-2, 2019

Scheman Building at Iowa State Center

Ames, Iowa

UPPER IOWA UNIVERSITY

EDUCATION BUILT FOR LIFE

Welcome to the 2018-2019 LSAMP IINSPIRE Annual Conference:

Navigating Pathways for STEM Student Success

Dear Conference Participants,

Upper Iowa University is pleased to host this year's annual conference of the Iowa, Illinois, Nebraska Louis Stokes Alliance for Minority Participation, or IINSPIRE LSAMP. IINSPIRE has become a focal point for increasing participation of underrepresented minority students in the STEM disciplines in the Midwest.

The theme of the IINSPIRE LSAMP Conference this year is "Navigating Pathways for STEM Student Success," a theme to which we are all dedicated on an ongoing basis.

We are fortunate at Upper Iowa University to have STEM faculty members who directly advise our students, thereby working closely with them to 'navigate' their educational experience through many experiential learning opportunities directly involving field sciences, along with laboratory and classroom learning experiences. In northeast Iowa the diversified natural resource base provides many 'field-based classrooms' for STEM students interested in disciplines such as conservation management, geosciences, and environmental science. Each year we look forward to sharing these learning experiences and associated student accomplishments at this Conference.

We appreciate all of the support that has gone into planning this event and in particular, those directly involved as members of the planning committee.

We all have a common commitment to our STEM students and their academic success, so let us take the time at this conference to celebrate our students.

Welcome to all of our student participants and those who support and mentor them along their pathways to success.

Warm regards,

P. Joan Poor
Provost
Upper Iowa University

Table of Contents

NATIONAL SCIENCE FOUNDATION
Louis Stokes Alliance for Minority Participation

The Iowa Illinois Nebraska STEM Partnership for Innovation in Research and Education (IINSPIRE) Louis Stokes Alliance for Minority Participation (LSAMP) Program is supported by the National Science Foundation Grant No HRD-1619654, October 2016-2021. Any opinions, findings, and conclusions or recommendations expressed in these materials are those of the authors and do not necessarily reflect the view of the National Science Foundation.

Keynote & Invited Speakers

Jacquelyn Bolman

President and Co-Founder, InterTribal Student Services

According to Lakota belief, the start of each person's existence begins among the millions of stars that stretch across the night sky to form the Milky Way. We journey through this trail of stars until we reach the southern end, where we are asked by Maya Owichapaha, the grandmother, to select our life story. I am here as both a Native and an environmental scientist. As a Native scientist, I have access to millennia of environmental observations by my people to understand how the four elements—earth, air, fire, and water—interact so that I can bring harmony to the environment. As an environmental scientist, I draw on a wide range of scientific disciplines to understand the environment and the many interactions that take place on a physical, chemical, and biological level.

I am also a mentor who helps young people make connections between their cultural understanding of the environment and what they are learning in traditional science classes. I do this by sharing openly everything that I have learned about science and life. I believe this connection is key for allowing young people to draw on a variety of different perspectives in order to create a sustainable world for all living things.

Esdras Murillo

Electrical Engineer, Baker Group

Esdras Murillo is originally from Honduras, where he met his wife while she doing an internship. In 2010, he and his wife moved to the Iowa without knowing any English. Esdras enrolled at DMACC Urban campus for ESL classes and soon realized his interests was in electrical engineering. He has always enjoyed designing and creating better systems for buildings and structures. While at DMACC Urban Campus he was part of Trio SSS, IINSPIRE LSAMP, and tutored students in Spanish and Math.

In 2013, Esdras transferred to Iowa State University, where with IINSPIRE LSAMP support and Undergraduate Research Assistant (URA) funding he worked as a research assistant and was awarded various recognitions. He's presented at various conferences, including the Emerging Researcher National (ERN) Conference and has authored a scientific publication, "Solar driven liquid desiccant systems for residential applications."

In December 2016, he recieved his Bachelors of Electrical Engineering degree and today works on electrical design for commercial and industrial applications at Baker Group, an innovative full MEP Design Build Contractor. Esdras enjoys spending his time outside of work with his wife and two-year-old daughter.

Leo Rodriguez

Assistant Professor, Grinnell College

Leo Rodriguez received his Ph.D. in physics from the University of Iowa in 2011, after which he served as an HHMI postdoctoral research fellow at Grinnell College and held subsequent faculty positions at Grinnell College and Assumption College. Leo rejoined the physics faculty at Grinnell College in the fall of 2018. Leo's research interests focus on the thermodynamic properties of black holes, how they relate to quantum gravity and how they are encoded in dual conformal field theories. In addition to his research interests, Leo spends much time teaching physics and mathematics within the undergraduate curriculum and enjoys making difficult and esoteric topics accessible and understandable to future physicists. Outside of his professional career, Leo enjoys spending time with his family, training Judo and fishing for trout.

CONFERENCE SCHEDULE

Friday, February 1

12:00 PM – 12:50 PM	**LUNCH** *(optional)* *Open seating available in Room 167-171*	1st Floor Lobby
	PRE-CONFERENCE SESSSIONS	
	Just in Time Math in the STEM Classroom ▼	Room 150-154
	Poster and Oral Poster Presentation Judges' Meeting ▼	Room 275
1:00 PM – 1:50 PM	**WELCOME & OPENING KEYNOTE**	Thomas H. Benton Auditorium
	Welcome *Joan Poor, Provost, Upper Iowa University*	
	Boundary Conditions in Science and Academics: Navigating Your Path Through the Universe *Leo Rodriguez, Assistant Professor, Grinnell College*	
2:00 PM – 2:50 PM	**CONCURRENT SESSIONS**	
	Approaches and Tools to Form and Participate in Teams ■	Room 150-154
	STEM Skills in the U.S. Industry/Workforce: What Every Employer Wants from Graduates ◆	Room 167-171
	From Water to Writing – My Fabulously Convoluted STEM Pathway ◆	Room 175-179
	Oral Poster Presentations – Group 1 ■	Room 275
3:00 PM – 3:50 PM	**STUDENT OPPORTUNITIES FAIR** *Continues until 5:00pm*	1st Floor Lobby
	CONCURRENT SESSIONS	
	Ethnoscience Strategies for Indigenizing Science at Tribal Colleges: Connecting Chemistry to the Tribal Community ▼	Room 150-154
	Calling "Aspiring" Teachers: STEM Teaching at the Community College ◆	Room 167-171
	IINSPIRE LSAMP Career Development Survey Session ◆	Room 175-179
	Oral Poster Presentations – Group 2 ■	Room 275
4:00 PM – 4:50 PM	**STUDENT OPPORTUNITIES FAIR**	1st Floor Lobby
	CONCURRENT SESSIONS	
	Strategies for Managing Uneven Math Preparation in the Classroom ▼	Room 150-154
	Meet Me Where I Am: Guide Me Where I Need to Go ■	Room 167-171
	IINSPIRE LSAMP Career Development Survey Session ◆	Room 175-179
5:00 PM – 6:30 PM	**STUDENT RESEARCH & EXPERIENTIAL POSTER SESSION**	1st Floor Lobby
6:30 PM – 7:00 PM	Break	
7:00 PM – 8:30 PM	**STUDENT EVENING SESSION & DINNER ◆**	Room 167-179
	Networking Social with Carmen Jones and IINSPIRE LSAMP Alumni Committee	
	IINSPIRE LSAMP STEERING COUNCIL MEETING & DINNER *(Invitation only)*	Radisson Hotel Woodland Room

Target Audience: ▼ Faculty Session ◆ Student Session ■ All Audiences

CONFERENCE SCHEDULE

Saturday, February 2

7:30 AM – 8:00 AM	**BREAKFAST** *(optional)* *Open seating available in Room 167-171*	1st Floor Lobby
8:00 AM – 8:50 AM	**MORNING KEYNOTE** **Looking Beyond Oneself:** **Self Determination and Sovereignty in STEM** *Jacquelyn Bolman, President and Co-Founder, InterTribal Student Services*	Thomas H. Benton Auditorium
9:00 AM – 9:50 AM	**CONCURRENT SESSIONS**	
	STEM Talking Circle ■	Room 150-154
	Getcha Head in the Game – Using Your Resources Wisely to Excel While Avoiding Becoming Overwhelmed ◆	Room 167-171
	Mathematics is All Around Us: This is Why You Should Study It! ◆	Room 175-179
	IINSPIRE Alliance Career Development Study: Psychosocial Factors Influencing Underrepresented Students' Persistence in STEM ■	Room 275
10:00 AM – 10:50 AM	**CONCURRENT SESSIONS**	
	Careers in Field-Based STEM Disciplines: Opportunities and Challenges ■	Room 150-154
	How to Submit a Quality REU Application ◆	Room 167-171
	Who and What Your Mentor Should Be: Negotiating Power and Professional Presence ◆	Room 175-179
	Resilience in the Face of Adversity in STEM for Minority Students ■	Room 275
11:00 AM – 11:50 AM	**CONCURRENT SESSIONS**	
	Education in Field-Based STEM Disciplines: Opportunities and Challenges ■	Room 150-154
	A Woman of Color Navigates the Computer Science Department at a PWI ◆	Room 167-171
	Prestigious Fellowships Workshop: Submitting a Successful Graduate Fellowship Application ■	Room 175-179
	What's in it for Me – Being a Scientist? ■	Room 275
11:50 AM – 12:10 PM	**LUNCH** *Seating in room 167-179*	1st Floor Lobby
12:10 PM – 1:00 PM	**LUNCH KEYNOTE** **Engineering Your Success Path** *Esdras Murillo, Electrical Engineer, Baker Group*	Room 167-179
1:10 PM – 2:00 PM	**CONCURRENT SESSIONS**	
	Preparing for the Future with IINSPIRE Alumni: An Interactive Dialogue and Interview Skills Workshop ◆	Room 150-154
	Using Comedy to Explain Mathematics ■	Room 275
2:10 PM – 3:00 PM	**AWARDS CEREMONY**	Thomas H. Benton Auditorium

Target Audience: ▼ Faculty Session ◆ Student Session ■ All Audiences

STUDENT CONFERENCE EXPERIENCE

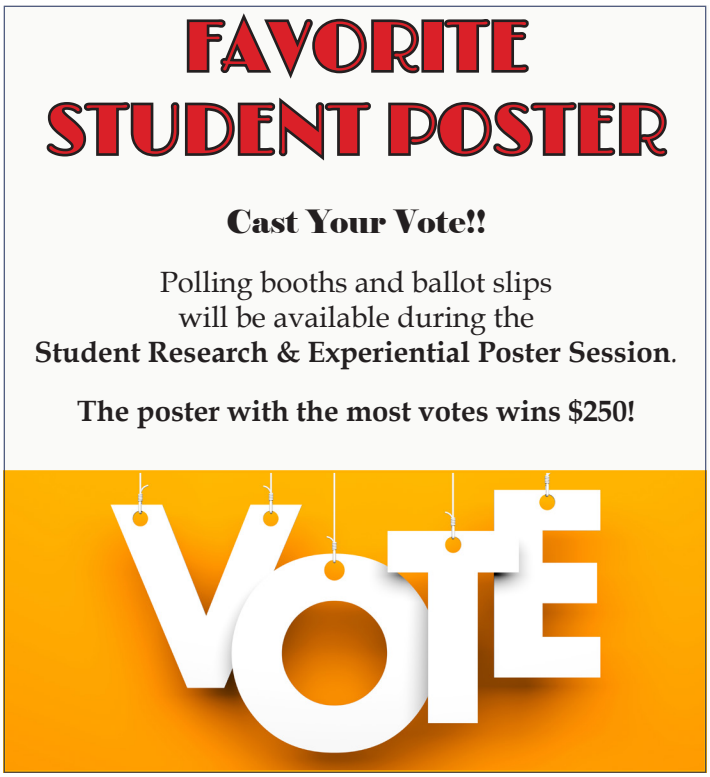
Student Schedule of Events

FRIDAY

12:00 – 12:50 PM	Lunch *(optional)*
1:00 PM	Welcome & Opening Keynote
3:00 – 4:50 PM	Student Opportunities Fair
5:00 – 6:30 PM	Student Research & Experiential Poster Session
7:00 PM	Student Networking Social with Carmen Jones and the Alumni Committee

SATURDAY

7:30 - 8:30 AM	Breakfast
8:00 AM	Morning Keynote
11:50 – 12:10 PM	Lunch
12:10 – 1:00 PM	Lunch Keynote
1:10 – 2:00 PM	Preparing for the Future with IINSPIRE Alumni: An Interactive Dialogue and Interview Skills Workshop
2:10 – 3:00 PM	Awards Ceremony



Student Expectations

The goal of the IINSPIRE LSAMP conferene is to provide students with a robost opportunity to engage, learn, and connect with students, faculty, and professionals with a shared interest in STEM. To help us achieve this goal, we ask that students who attend the conference keep the following expectations in mind when participating in conference activities.

1. **DEVELOP SKILLS** that align with the IINSPIRE LSAMP Program Competencies (see right).
2. **ACTIVELY ENGAGE** with conference participants.
3. **EXPRESS INTEREST** in others and ask questions.
4. **BE ATTENTIVE** and take notes of your conversations
5. **MAKE CONNECTIONS** that expand your professional network.

Student Engagement

This is a time for you to learn how to Navigate your Career Pathway. In order to do this you must ***ENGAGE, BE PRESENT, AND WORK*** at your participation.

The IINSPIRE-LSAMP Program strives to instill eight fundamental competencies* in our interns. **We hope that you will utilize this conference to build these competences**:

1. Understand the multi-disciplinary nature of science.
2. Investigate a research problem employing study design, data collection, and analytical techniques.
3. Develop a proactive engagement in a research mentor-mentee relationship.
4. Conduct research according to professional ethics and regulatory guidelines.
5. Develop professional written and oral science communication skills.
6. Teach others through classroom teaching and service-oriented learning.
7. Work effectively in cross-cultural situations.
8. Communicate scientific concepts and interpretations to scientists in other disciplines.

** Competencies based on Byars-Winston et al., 2011; Brewer & Smith, 2011*

SESSION DESCRIPTIONS

Friday, February 1

12:00 PM – 12:50 PM/PRE-CONFERENCE SESSIONS

ROOM 150-154

JUST IN TIME MATH IN THE STEM CLASSROOM

Cailin Huyck Orr, Science Education Resource Center at Carleton College; Jim Swartz, Grinnell College

This session will introduce and explore the strategy of using short, student-led, modular math interventions at strategic points in a science course to serve as a reminder for students who have had the math concept previously, or introduce a new concept to a student who is catching up on math preparation as it applies to science. The workshop will draw material from existing programs, and also allow participants to share their own experiences and tips. Time will be allotted for individual planning. Participants will have the opportunity to help shape the summer pedagogy workshop. Workshop resources will be available at: https://serc.carleton.edu/lsamp/workshops/feb2019/index.html. **Target audience: Faculty.**

ROOM 275

POSTER AND ORAL POSTER PRESENTATION JUDGES' MEETING

U. Sunday Tim, Iowa State University

The judges for the student research and experiential posters and oral poster presentations will meet to discuss judging responsibilities and receive judging materials and instructions. **Target audience: Pre-Identified Volunteers**.

1:00 PM – 1:50 PM

THOMAS H. BENTON AUDITORIUM

Leo Rodriguez

WELCOME & OPENING KEYNOTE

Welcome

Joan Poor, Provost, Upper Iowa University

Boundary Conditions in Science and Academics: Navigating Your Path Through the Universe

Leo Rodriguez, Assistant Professor, Grinnell College

In this talk I will discuss some of the pathways (and their initial conditions) I ventured along in my journey to becoming a theoretical physicist in the Academy. Growing up in an environment where school was viewed more as a convenient daycare for children until they were old enough to join the family construction business in any capacity, the pathway to academic success was not very clear or even imaginable. However, my desire for trying to understand and learn about fundamental phenomena in our universe and to pursue the study of physics fueled my voyage, setting me on a course to share my experiences and expertise on the nature of black holes and their thermodynamics.

2:00 PM – 2:50 PM/CONCURRENT SESSIONS

ROOM 150-154

APPROACHES AND TOOLS TO FORM AND PARTICIPATE IN TEAMS

Adin Mann, Emerson (Fisher Valves)

Teams, Teams, Teams – that is a common mantra heard through education. One rationale is that when you get a job, companies are looking for how you will work in a team. Teams are seen in academia and industry. When I was in school and beyond, we heard this, but seldom did anyone help us understand what this meant. During this workshop, some ideas on how to form teams and how to participate in teams will be discussed. In addition, a process to get buy-in to form a team will be presented. The buy-in is needed from leaders in an organization as well as potential team members. We will discuss criteria for someone to become a member of a team, other than that they have a pulse. The role of clearly establishing core values for the team, a project charter, and the role of commitment of the team members to the team will be discussed. The goals for the work shop is that you will have some specific tools and guides to create and participate on a well-functioning team. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

ROOM 167-171

STEM SKILLS IN THE U.S. INDUSTRY/WORKFORCE: WHAT EVERY EMPLOYER WANTS FROM GRADUATES

Roger Bently, Workiva Inc.; Kevin Gaul, Pella Corp.; Sara Hunter, Vermeer Corp.; Esdras Murillo, Baker Group

A consistent theme running through numerous employer survey and feedback on graduate skills point to the desire for graduates to possess a set of knowledge, platform skills, and core competencies which will allow them to contribute fully in the workplace. Survey data also indicates that while employers are generally satisfied with the employability skills of graduates compared to non-graduates, gaps in skills and competencies exist, prompting the following questions: Which "soft" or "hard" skills are most valued by employers when making hiring decisions? How are employers assessing these skills during the hiring process? Will other credentials help increase graduate job placement rates? How can educators work more collaboratively with industry and employers who hire their graduates? In this session, expert panelists and leaders in a range of STEM employment sectors will address these key questions. They will present their perspectives on the field and the type of workforce skills and competencies, and what it takes to become a competitive applicant and to have a successful career in the STEM industry. **Target audience: Graduate Students, Undergraduate Students.**

ROOM 175-179

FROM WATER TO WRITING – MY FABULOUSLY CONVOLUTED STEM PATHWAY

Lisette E. Torres-Gerald, Nebraska Wesleyan University

Using my experiences in aquatic ecology, higher education, and advocacy as case studies, I showcase how truly confusing, enlightening, and rewarding a STEM pathway can be for anyone who is willing to be open-minded. I share the institutional barriers I have encountered along the way and how I "overcame" them by forging my own path. By listening to my intuition and reflecting on the strengths of my ancestors, I have made decisions that have allowed me to use my STEM training in a variety of different ways, which has set me apart from other scholars and scientists. For example, thanks to my science background, I am now a director of a writing center as well as an accessibility editor for a national science activist magazine. I have also had the opportunity to collaborate with burgeoning STEM organizations as evidenced by my participation as a guest on a recent #ScienceRising Twitter Chat organized by the Union of Concerned Scientists. I share my story to illustrate that students (1) should listen to their own gut, (2) should draw from their cultural backgrounds and intuition, and (3) should take comfort in the fact that a STEM degree can open doors to all sorts of possibilities. **Target audience: Graduate Students, Undergraduate Students.**

ROOM 275

STUDENT ORAL POSTER PRESENTATIONS – GROUP 1

The Impacts of Goat Grazing on Invasive Sand Prairie Plant Species
Hillery Hartwig, Augustana College

OPA-1Deficiency Promotes Muscle Atrophy through Upregulating ER-Mito Contacts and Autophagy
Benjamin Kirk, University of Iowa

Computational Investigation of Adaptive Gas Turbine Blade Technology
Nikita Kozak, Iowa State University

Micro-channel Cantilever Spotting (µCS) and the Immobilization of Cucurbit[7]uril Complex for Determination of Sensitivity on Analyte Exposure
Andres Mora, Doane University

Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.

3:00 – 3:50 PM/CONCURRENT SESSIONS

1st FLOOR LOBBY

STUDENT OPPORTUNITIES FAIR

Continues until 5:00pm

ROOM 150-154

ETHNOSCIENCE STRATEGIES FOR INDIGENIZING SCIENCE AT TRIBAL COLLEGES: CONNECTING CHEMISTRY TO THE TRIBAL COMMUNITY

Bev DeVore-Wedding, University of Nebraska-Lincoln; Janyce Woodard, Little Priest Tribal College

The importance of engaging students through hands-on laboratory experiments and connecting to their personal experiences cannot be overstated. Including students' cultural backgrounds as a component of the class is often called Ethnoscience. Ethnoscience, its foundations and principals, in terms of American Indians and Alaska Natives was described in the 1990s. Building on this model, Turtle

Mountain Community College revised their chemistry labs in the early 2000s. We have developed a two-semester chemistry lab manual for a general, organic, and biochemistry introductory course. Each lab has a tribal community connection to increase authenticity and relevancy of the chemistry concepts. Specific community connection information has been provided in the background of each lab, but each lab report provides students the opportunity to share their own personal connection. Why community connections? Connecting chemistry content to students' a prior knowledge, authentic phenomenon, and culturally-relevant topics increases the learning of new content. The community connection section of each lab only scratches the surface of the tribal community connections. The sharing of their own connections will enrich the authenticity of the chemistry as well as the instructor's and classmates' own knowledge. We have incorporated some of these stories into the lab manual, but each instructor and time the course meets, students will bring their own connections that will enhance learning and understanding of content. In fact, while the lab is static, the indigenization is a dynamic work in progress. This increases the sustainability of the chemistry course as well. **Target audience: Faculty.**

ROOM 167-171

CALLING "ASPIRING" TEACHERS: STEM TEACHING AT THE COMMUNITY COLLEGE

Mary Darrow, Iowa State University; Susan Harthun and Ted Weiland, Kirkwood Community College; Bobby Elam and Sally Wilson, Marshalltown Community College; Nancy Woods, Des Moines Area Community College

Have you ever considered a teaching career at a community college? This career path can have high impacts on students beginning their higher education and often includes a strong community focused teaching environment. This panel of faculty will discuss their experiences in community college teaching. The discussion will include their career path, what they like most about the community college setting, and common misconceptions about the career. The panel will take questions from future "Aspiring" faculty. You will also learn about the newly funded Aspire NSF INCLUDES Alliance: National Alliance for an Inclusive and Diverse STEM Faculty (Grant Nos. DUE-1231286 & DUE-1726625). **Target audience: Graduate Students, Undergraduate Students**

ROOM 175-179

IINSPIRE LSAMP CAREER DEVELOPMENT SURVEY SESSION

Saba Rasheed Ali, University of Iowa; Sarah Rodriguez, Iowa State University; J.Y. Cindy Kim, University of Iowa; Changyue (Kyle) Li, Iowa State University

With continued efforts in collecting responses from IINSPIRE LSAMP students, the IINSPIRE LSAMP Quantitative research team will provide a space for students to easily access and finish the survey throughout their experience at the annual conference. Students can join the session at any time throughout the scheduled session time(s), and finish the survey. The survey is estimated to take about 15 minutes to complete. Students who finished the survey in 2017 do not have to finish the survey this year. **Target audience: IINSPIRE LSAMP Undergraduate Students.**

ROOM 275

STUDENT ORAL POSTER PRESENTATIONS – GROUP 2

Damming of the Missouri River and its Effects on the Threatened False Map Turtle
Lucas Goodman, Iowa State University

Sex Differences in the Response of C57BL/6 Mice to Ketogenic Diets
Jesse Cochran, University of Iowa

3D Nanostructure Printing With Graphene Ink
Haley Montgomery, Des Moines Area Community College

Estrogen Positively Affects Spatial Discrimination in Female Ovariectomized Rats
Raissa Souza, Nebraska Wesleyan University

Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.

4:00 PM – 4:50 PM/CONCURRENT SESSIONS

1st FLOOR LOBBY

STUDENT OPPORTUNITIES FAIR

ROOM 150-154

STRATEGIES FOR MANAGING UNEVEN MATH PREPARATION IN THE CLASSROOM

Cailin Huyck Orr, Science Education Resource Center at Carleton College; Jim Swartz, Grinnell College

This session will explore the common situation of managing a STEM classroom with students of different levels of preparation. Strategies will be discussed for providing support for students coming with less experience in the subject, or prerequisite subjects, while also challenging students who come with a higher level of experience or readiness and creating a climate of respect. Information from existing projects will

be introduced and we will discuss ideas for implementing a growth mindset into the STEM classroom. Participants will be encouraged to share their own experiences and successes, and time will be allotted for individual reflection and planning. Participants will have the opportunity to help shape the summer pedagogy workshop. Workshop resources will be available at https://serc.carleton.edu/lsamp/workshops/feb2019/index.html. **Target audience: Faculty.**

ROOM 167-171

MEET ME WHERE I AM; GUIDE ME WHERE I NEED TO GO

Latricia Hylton, University of Northern Iowa

LSAMP scholars have various academic and professional goals, but the LSAMP program has one objective. How does an LSAMP campus director develop and structure an effective program that meets each scholar's needs, the IINSPIRE Alliance objectives, and NSF guidelines? This working session provides campus directors the opportunity to identify the foundational elements of their students' needs and the structure for utilizing students' needs to build a framework that benefits all participants but empowers each scholar to achieve their academic and professional goals. LSAMP scholars will share how they have benefitted from using the comprehensive framework developed by the University of Northern Iowa LSAMP Program. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

ROOM 175-179

IINSPIRE LSAMP CAREER DEVELOPMENT SURVEY SESSION

Saba Rasheed Ali, University of Iowa; Sarah Rodriguez, Iowa State University; J.Y. Cindy Kim, University of Iowa; Changyue (Kyle) Li, Iowa State University

With continued efforts in collecting responses from IINSPIRE LSAMP students, the IINSPIRE LSAMP Quantitative research team will provide a space for students to easily access and finish the survey throughout their experience at the annual conference. Students can join the session at any time throughout the scheduled session time(s), and finish the survey. The survey is estimated to take about 15 minutes to complete. Students who finished the survey in 2017 do not have to finish the survey this year. **Target audience: IINSPIRE LSAMP Undergraduate Students.**

5:00 PM – 6:30 PM

1st FLOOR LOBBY

STUDENT RESEARCH AND EXPERIENTIAL POSTER SESSION

7:00 PM – 8:30 PM

ROOM 167-179

NETWORKING SOCIAL WITH CARMEN JONES AND THE ALUMNI COMMITTEE

Paul Faronbi, Nestle Purina; Carmen Jones, Iowa State University;
Queenster Nartey, John Hopkins School of Medicine

When was the last time you received constructive feedback on your resume? As we approach REU and job application season, we understand that it can be a stressful task trying to compile all those wonderful experiences that make you a great candidate. The goal of this session is to provide an interactive environment where students can learn how to develop a robust resumé. With the help of Carmen Jones, students will learn how to highlight their strengths, emphasize their skills, and write powerful descriptions to make stellar resumés. Students will then apply their knowledge by providing feedback to their peers' anonymous resumés. We hope you come join us! **Target audience: IINSPIRE LSAMP Alumni, Graduate Students, Undergraduate Students.**

SESSION DESCRIPTIONS

Saturday, February 2

8:00 AM – 8:50 AM

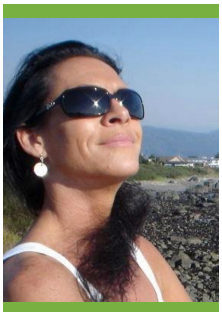
THOMAS H. BENTION AUDITORIUM

MORNING KEYNOTE

Looking Beyond Oneself: Self Determination and Sovereignty in STEM

Jacquelyn Bolman, President and Co-Founder, InterTribal Student Services

The presentation will highlight the processes of self-determination and sovereignty in the higher education STEM experience. The participant will learn techniques to apply unique cultural and geographical characteristics, values and ways of knowing to their STEM pathway and story. The goal is for participants to "look beyond themselves" toward a greater vision of themselves and their STEM field.



Jacquelyn Bolman

9:00 AM – 9:50 AM/CONCURRENT SESSIONS

ROOM 150-154

STEM TALKING CIRCLE

Jacquelyn Bolman, President and Co-Founder, InterTribal Student Services

The session will utilize the talking circle to create opportunities to "visit" and "converse" in an intergenerational format. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

ROOM 167-171

GETCHA HEAD IN THE GAME – USING YOUR RESOURCES WISELY TO EXCEL WHILE AVOIDING BECOMING OVERWHELMED

Raissa Souza, Nebraska Wesleyan University; Victory Amos-Nwankwo, Nebraska Wesleyan University; Allie Wilson, Nebraska Wesleyan University

The psychological and emotional stressors associated with being an underrepresented student at a predominantly White institution are not always acknowledged or addressed, even by the individuals experiencing those pressures. This session is designed to engage the audience in a conversation about the importance of identifying potential barriers to academic success and maintaining mental health. We want to motivate underrepresented students to balance achieving excellence with self-care and community support. By sharing our own stories, including how resources like LSAMP at our own institution have helped us, we want to highlight the process of reaching out for help. We will discuss the various types of support LSAMP provides, such as career information, research opportunities, internships, and academic support (e.g., revision of essays for applications). We want to encourage our LSAMP peers to do research, write personal statements, and prepare for interviews early. Our stories are meant to inspire them to be a positive catalyst and to use their passions to impact the world. The barriers we face will not stop, but we are resilient and possess the power to change minds and hearts, individuals and institutions. Ultimately, we need to realize that "[o]ur biggest fear is not that we are inadequate, our biggest fear is that we are powerful beyond measure" (Marianne Williamson). **Target audience: Graduate Students, Undergraduate Students.**

ROOM 175-179

MATHEMATICS IS ALL AROUND US: THIS IS WHY YOU SHOULD STUDY IT!

U. Sunday Tim, Iowa State University

As the important "M" in STEM, mathematics is an essential discipline in today's educational landscape. From the use of abstract reasoning and structures to make inferences about the world from data to serving as natural conduit through concepts, tools, and best practices can migrate from discipline to discipline, many professions such as engineering, medicine, business, nursing, computer science etc.,require math proficiency. In essence, math is around us! And there is increasing demand for graduates and workers with math skills regardless of their field of training. So, why is math competency relevant and why should students study it? How do educators instill in students the clarity and rigor that characterize core math and that math is for all? In this session, a panel of educators and experts will address these questions and comment on the increasing role of mathematical sciences in the 21st century education landscape and workforce. **Target audience: Graduate Students, Undergraduate Students.**

ROOM 275

IINSPIRE LSAMP CAREER DEVELOPMENT STUDY: PSYCHOSOCIAL FACTORS INFLUENCING UNDERREPRESENTED STUDENTS' PERSISTENCE IN STEM

Saba Rasheed Ali, University of Iowa; Sarah Rodriguez, Iowa State University; J.Y. Cindy Kim, University of Iowa; Changyue (Kyle) Li, Iowa State University

Focused on transitions from high school and community college to undergraduate studies, this research examines micro-level influences related to how students move within the STEM disciplines and access resources. It also examines macro-level influences related to program interventions that influence STEM success. A cross-sectional survey was conducted at the end of the year in the summer of 2017 and 2018, using a multi-stage stratified cluster sample design. Inclusion criteria for participation in the study included for the following: (a) enrollment in one of the 16 two-year and four-year colleges and universities across the states of Iowa, Nebraska, and Illinois at the time of the survey; (b) identify with one or more of the underrepresented populations in STEM; (c) major in a STEM-related field; (d) participation in program(s) that included research mentorship, opportunities for social community, and efforts in professional development. A representative random sample of 107 students aged 17 to 31 years was selected using multi-stage stratified cluster sampling from a population size of 583 (Population size: N2017=283, N2018=300). Measures included the Research Self-Efficacy, Outcome Expectations, the Science Identity Measure, as well as items to measure perceptions of campus climate, grades in STEM courses and GPA, learning experiences and persistence in STEM disciplines. Path analyses will be used to test the hypothesized pathways in the SCCT model and to explore the values in learning experiences for persistence in STEM for underrepresented populations. Results, training implications, and future research will be discussed. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

10:00 AM – 10:50 AM/CONCURRENT SESSIONS

ROOM 150-154

CAREERS IN FIELD-BASED STEM DISCIPLINES: OPPORTUNITIES AND CHALLENGES

Brian Ritter, Nahant Marsh; Ryan Anthony, US Fish & Wildlife Service; Karri Folks, Iowa State University; Dave Murcia, Scott County Conservation Board; William Peek, USDA Natural Resource Conservation Service

Hyrdrology, soil science, field biology and ecology, forestry, agriculture, mining, and other natural resource management careers in the field-based STEM disciplines are rewarding, and most STEM professions recognize the need to expand the diversity of the workforce to more closely match the diversity of the US population. However, students aspiring to enter these careers may encounter additional challenges, and these may be especially acute for URM and non-traditional students. Few URM role models and mentors are evident in the field sciences, and building a cumulative record of seasonal, internship or research-based field experiences is a "must" for everyone pursuing a career in these fields. Relocation that is necessary for career advancement may present obstacles, along with obtaining PPE and personal field equipment. Join our panel of successful field scientists and professionals to learn more about how to build your professional network, gather necessary resources, and successfully navigate your way to career success in field-based STEM disciplines! **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

ROOM 167-171

HOW TO SUBMIT A QUALITY REU APPLICATION

Nancy Woods, Des Moines Area Community College

Does writing a "Personal Statement" stand between you and a complete application for next summer's REU? Are you afraid that your resume is something "less than" in comparison to others'? Let's get together to talk about these things! In this session, we will talk about how to put together a solid Personal Statement as well as examine some of the components that need to be present in your academic resume. This session will be a lively discussion of ways that we can make your REU applications standout. Join us! **Target audience: Graduate Students, Undergraduate Students**.

ROOM 175-179

WHO AND WHAT YOUR MENTOR SHOULD BE: NEGOTIATING POWER AND PROFESSIONAL PRESENCE

Ashley Garrin, Iowa State University; Lynn Lundy Evans, Iowa State University

Mentors not only guide us along our personal, academic, career or life paths, they are usually along for the ride. Good mentors can assist us with our goals, decisions, opportunities, and overall personal and professional growth. The impact of a mentor can have long-lasting effects, both good and bad. In this presentation, we will discuss mentoring experiences to first learn how have you experienced mentoring and what types of mentors might help you thrive. We will explore varying mentoring practices and how they influence your professional presence, self-confidence, competence in your learning, and credibility in your work. By engaging in this interactive session, you will be able to: 1) determine what type of mentoring relationship works best for your personal, academic and professional development; 2) negotiate

what you both need and desire in a mentor; and 3) apply knowledge and use the tools you have to develop your professional presence through mentoring relationships. **Target audience: Graduate Students, Undergraduate Students.**

ROOM 275

RESILIENCE IN THE FACE OF ADVERSITY IN STEM FOR MINORITY STUDENTS

Erica Satchell, Grinnell College; Chavely Calleja, Grinnell College; Daisy Hernandez, Grinnell College; Ruby Romero, Grinnell College

As female first-generation minority students attending a predominantly white institution, we wish to engage our audience in a discussion about how to overcome the obstacles that come with being a minority in STEM. We will give a background on who we are, our interest in STEM, as well as how we overcome adversity in STEM and higher education in general. We plan to engage the audience by sharing similar stories with each other about imposter syndrome, transitioning into a PWI, and overcoming personal obstacles as well. We will also mention the resources and support groups that we have utilized to overcome these difficulties. We hope our presentation can help our fellow minority students in STEM understand their value in the sciences, no matter the location of the institution. Also, we would like to share the tools that we have utilized thus far that have helped minimize the challenges that we have faced. Overall, in our presentation, we aim to provide a feeling of solidarity in who we are as minority students in STEM and collectively determine how we can succeed together through participant interaction by using a powerpoint presentation to assist with roundtable discussion. We hope to make our presentation as interactive as possible by actively including the audience. We know our audience will include peers from various institutions but we hope to make our presentation relate to students from all backgrounds. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

11:00 AM – 11:50 AM/CONCURRENT SESSIONS

ROOM 150-154

EDUCATION IN FIELD-BASED STEM DISCIPLINES: OPPORTUNITIES AND CHALLENGES

Kata McCarville, Upper Iowa University; Jeramie Strickland, US Fish & Wildlife Service; Charla Wilson, Iowa State University

Field-based STEM disciplines present great opportunities, but also carry with them challenges that may seem insurmountable to URM and non-traditional students. Students and their families may be unfamiliar with these disciplines, and there is little exposure to these fields in elementary or secondary education settings. URM students and their families may have fewer opportunities for outdoor recreation or exposure to these disciplines and potential career paths. Few URM faculty or professionals are found in the field sciences, so few role models are available. Housing, PPE and outdoor clothing, and transportation for field-based courses and research projects may be more difficult to obtain, and child care may be needed. Yet, students with interest in these disciplines can find supportive mentors, gain resources, and navigate their own pathways to success in field-based STEM disciplines. Strategies that work in the field-based disciplines are applicable to ALL, so feel free to join us! Join our panel of successful field scientists and professionals to learn more about how to build your professional network, gather necessary resources, and successfully navigate your way to academic success in field-based STEM disciplines! **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals**.

ROOM 167-171

A WOMAN OF COLOR NAVIGATES THE COMPUTER SCIENCE DEPARTMENT AT A PWI

Syamala Gumidyala, Grinnell College

As a woman of color trying to find my place in the field of Computer Science, I have faced challenges in navigating the department at my institution and have doubted my ability to complete the major; let alone be a computer scientist as a career. I am extremely passionate about technology and social justice and the field of Computer Science is at its peak of relevancy in the era we live in today. I feel as though I have experiences and a perspective that is unique in the STEM world and I'd like to share this experience with other women who may have doubted their ability as well. I have learned so much about growth, acceptance, belonging, and even identity thus far and I hope to inspire other women and minorities to believe in themselves as well. **Target audience: Graduate Students, Undergraduate Students.**

ROOM 175-179

PRESTIGIOUS FELLOWSHIPS WORKSHOP: SUBMITTING A SUCCESSFUL GRADUATE FELLOWSHIP APPLICATION

U. Sunday Tim, Iowa State University

Are you interested in obtaining prestigious fellowships to support your graduate education? This workshop session is for you! This workshop is designed to help students prepare and apply for different graduate fellowship opportunities, including the National Science Foundation (NSF) Graduate Research

Fellowship Program (GRFP). Participants will learn about the GRFP, the benefits and the required application documents. In addition, the workshop will walk you through the application process, timeline, how to request letters of recommendation, and advice and tips on writing an effective research statement (intellectual merits and broader impacts). Prestigious Fellowships such as the GRFP are intended to recognize and support outstanding graduate students in STEM disciplines. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

ROOM 275

WHAT'S IN IT FOR ME—BEING A SCIENTIST?

Antentor Hinton, Jr., University of Iowa

This seminar goes over the fundamental 10 things (i.e. teacher, research, speaker, entrepreneur, learner, coach, writer, administrator, colleague, and friend) that every scientist does on a regular basis and how to achieve in these areas if you are lacking. **Target audience: Faculty, Staff, Graduate Students, Undergraduate Students, Professionals.**

12:10 PM – 1:00 PM

ROOM 167-179

LUNCH KEYNOTE

Esdras Murillo

ENGINEERING YOUR SUCCESS PATH

Esdras Murillo, Electrical Engineer, Baker Group

Life can be challenging and even more when you are in college. I know it, I was there! Those long nights studying for an exam or doing homework for a class where you have no idea what is happening. However, sometimes as we hear other people's challenges, ours become easier or we see them from a different angle. In this talk I will be taking you through my own struggles while in school, as I was a non-traditional, first-generation student and English was not my first language. You will be hearing my strategies, struggles and successes while pursuing my electrical engineering degree. My hope is that my story can be inspirational and you can use it to propel you to achieve what you desire, because sometimes we all need that extra push.

1:10 PM – 2:00 PM/CONCURRENT SESSIONS

ROOM 150-154

USING COMEDY TO EXPLAIN MATHEMATICS

Douglas Shaw, University of Northern Iowa

In this workshop, we explain some mathematical concepts using improv and comedy. And we'll explain some comedy concepts using mathematics. Because if you are a clever, creative, person, you find that it's all part of the same soup! This will be a highly interactive workshop – you won't be seated the entire time. It is hard to really understand the complexities of dynamical systems, for example, while sitting still. The math will be real, the comedy will be real, and yet we still will have a fun and interesting time. Faculty members – you will be able to use some of what you learn in your own teaching. Everybody – you will learn some math, learn something about how comedy is structured, and leave appreciating both in a new way. **Target audience: Faculty, Staff, Professionals.**

ROOM 275

PREPARING FOR THE FUTURE WITH IINSPIRE ALUMNI: AN INTERACTIVE DIALOGUE AND INTERVIEW SKILLS WORKSHOP

Alfred Colina, Iowa State University; Paul Faronbi, Nestle Purina; Myra James, Purpose Driven Advocacy Center; Rodrigue Mbog, Southern Illinois University Edwardsville; Queenster Nartey, John Hopkins School of Medicine.

The future may seem distant, but there are many ways to start preparing right now! Whether you are interested in graduate school, a post-baccalaureate program, or a job in the industry, this session has something for you. IINSPIRE Alumni will talk about the opportunities and resources they took advantage of when they were in your shoes a few years ago! The main goal of this workshop, comprised of graduate students, post-baccalaureate students, and professionals in STEM, is to share experiences, give advice, and address questions through an interactive dialogue with current undergraduate students. Students will have the chance to rotate in different focus groups based on their interests (graduate school, post-bac, industry) and also participate in resume and interview workshops. IINSPIRE Alumni hope that current IINSPIRE students will gain a better understanding on how to be successful in the field of their choice and leave the session inspired and motivated to continue working towards their career goals! Students are encouraged to ask questions related to reasons why an Alum chose their career path. Anonymous questions are also welcome! Don't forget to bring a printed copy of your resumé! You don't want to miss this! **Target audience: Graduate Students, Undergraduate Students.**

STUDENT ORAL POSTER ABSTRACTS

SEX DIFFERENCES IN THE RESPONSE OF C57BL/6 MICE TO KETOGENIC DIETS

***Jesse Cochran**, Paul Taufalele, Kevin Lin, Yuan Zhang, Rhonda Souvenir, Antentor Hinton Jr., and E. Dale Abel*
University of Iowa

Since the initial use of ketogenic diets (KD) as adjunctive treatment for epilepsy, these diets are being increasingly used to promote weight loss and to reduce the risk of metabolic sequelae of severe obesity. Typical KD are very low in carbohydrate and high in fat, promoting hepatic production of ketone bodies. Most animal studies tend to be performed in male mice, and few studies have evaluated gender differences in response to KD. To explore sex differences in response to KD, female and male wild-type mice on the C57BL/6J background were fed either a control diet (CD- 7% fat, 47% carb., 19% protein) or KD (75% fat, 3% carb., 8% protein), following weaning. Females on the CD manifested higher levels of circulating β-hydroxybutyrate (β-HB) than males (2.86-fold, $p<0.05$). Circulating β-HB concentrations increased with KD in males and females (1.30-fold & 5.05-fold, $p<10\text{-}4$ & $p<0.01$ respectively) with higher concentrations in females. After 15 weeks of feeding, females on KD displayed an increase in body weight (1.07-fold KD vs. CD, $p<0.05$) while body weight declined in males (0.88-fold, $p<0.05$). Nuclear magnetic resonance (NMR) analysis revealed elevated lean mass in 18-week old females (1.07-fold, $p<0.05$), but a significant reduction in fat mass in males (0.49-fold, $p<0.05$) relative to sex-matched mice on CD. The female mice on KD developed impaired glucose tolerance with a 1.35-fold increase in glucose tolerance test area under the curve (GTT AUC) ($p<0.001$) relative to CD females. In contrast, fasting glucose levels were lower in males on KD (131.8 ± 12.5 mg/ dl vs. 169.2 ± 6.3 mg/dl, $p<0.05$). Despite no significant change in GTT AUC, the male mice on KD displayed elevated blood glucose concentrations 30 minutes after injection relative to males on CD (344.9 ± 18.7 mg/ dl vs. 272.0 ± 10.31 mg/dl, $p<0.05$). However, after 120 minutes, blood glucose levels returned to initial levels. To further investigate the role of estrogen in this sexual dimorphism, female mice were ovariectomized (OVX) and randomized to receive either a CD or KD after weaning. At 15 weeks old, OVX mice on KD displayed decreased body weight (0.84-fold, $p<0.0001$) and fat mass (0.65-fold, $p<0.001$) relative to CD-fed mice. Despite changes in body composition, OVX mice on KD still exhibited impaired glucose tolerance with a 1.4-fold increase in GTT AUC comparable to OVX mice on CD ($p<0.05$). In conclusion, significant sex differences exist in terms of body composition and metabolism in response to ketogenic diet, which may partially be attributed to estrogen.

DAMMING OF THE MISSOURI RIVER AND ITS EFFECTS ON THE THREATENED FALSE MAP TURTLE

***Lucas Goodman**[1], Anna Kase[2], and Jacob Kerby[2]*
[1]Department of Natural Resources Ecology and Management, Iowa State University, Ames, IA 50011
[2]Department of Biology, University of South Dakota, Vermillion, SD 57069

Loss of biodiversity due to habitat degradation is one of the largest problems affecting native ecosystems today. This can be seen in the Missouri River where the construction of 15 dams has impacted native species, such as the South Dakota State Threatened false map turtle (Graptemys pseudogeographica). The furthest north this species has been scientifically recorded is the Oahe Dam on the Missouri River in South Dakota. However, little research has been done investigating how the dam has altered their preferred habitat. Previous research has shown that habitat suitability is a primary factor in determining turtle species distribution in riverine systems. Our goal was to investigate whether river modification resulting from the Oahe Dam altered availability of habitat preferred by false map turtles. We hypothesized that false map turtle presence would be associated with habitat characteristics found in moderate-to-fast moving rivers: deadwood basking sites, dirt shoreline substrate, and riparian shoreline habitat. Methods included trapping, visual surveys, and environmental DNA extraction to determine species presence, and habitat characteristics were recorded and compared across sites. All turtles were found downstream of the dam, and our findings indicated a significant association of false map turtles with deadwood basking sites ($p= 0.021$), dirt shoreline substrate ($p= 0.003$), and riparian shoreline habitat ($p= 0.003$). Results suggest the construction of the Oahe Dam negatively impacts false map turtle populations due to habitat alteration. Further research extending study sites into dams south of Lake Oahe could provide insight on similar problems faced by false map turtle populations.

THE IMPACTS OF GOAT GRAZING ON INVASIVE SAND PRAIRIE PLANT SPECIES

Hillery Hartwig
Augustana College

Nahant Marsh is one of the largest urban wetlands on the Upper Mississippi River, located in Southwest Davenport, Iowa. Among the marshy areas and bottomland forest, the wetland also contains mesic, wet, and sand prairies. The restoration of prairie ecosystems across North America is imperative to their conservation, due to the loss of almost 200 million acres of prairies and grasslands across the United States. Two areas of the sand prairie at Nahant Marsh were used to observe the effect of goat grazing as a restoration practice, in an area of tree encroachment. A 10 meter transect line was set up through the middle of both the control and experimental areas of the sand prairie. Before the goats were introduced to the experimental area, a pre-survey was done along the transects using a square-meter. At every other even meter, plants that fell within a square meter of the transect line were counted and identified. After the goats had grazed the experimental area for two weeks, a post-survey was done in the same way. Additionally, the evenness and diversity index of each transect was calculated. The data showed that there was an overall increase in evenness and decrease in diversity of the plant species in the prairie after goat grazing. The goats grazed and trampled both invasive and native species. It was concluded that goat grazing may best be utilized as a restoration strategy when combined with other management strategies, such as controlled burning or manual removal of invasive species.

OPA-1DEFICIENCY PROMOTES MUSCLE ATROPHY THROUGH UPREGULATING ER-MITO CONTACTS AND AUTOPHAGY

***Benjamin Kirk**, Margaret Mungai, Yahang Li, Jake "Leo" Kazma, Serif Bacevac, Antentor Othrell Hinton, Jr., Renata Pereira Alambert, and E. Dale Abel*
University of Iowa

Type 2 Diabetes in some patients has been shown to have dysregulated Mitochondria Associated Membranes (MAMs) and decreased muscle mass. MAMs are enriched with specific proteins and lipids that aid in specialized structural rearrangements such as the formation of autophagosomes. Decreased optic atrophy protein-1 (OPA-1) in skeletal muscle has been reported in both murine and human type II diabetic models. Loss of OPA-1 in skeletal muscle has been observed to cause muscle atrophy and increase mitochondria associated membrane-tethering protein, MFN-2. Therefore, we hypothesized that OPA-1 deficiency increases muscle atrophy through a MAM-Autophagosome Interaction (MAI). To investigate the role of OPA-1 on MAI, studies were performed in mice that had OPA1 silenced in skeletal muscle and in satellite cells isolated from floxed OPA-1 mice that were infected with adenoviral Cre recombinase to delete OPA1. Ablation of OPA-1 in skeletal muscle increased the following MAM proteins: MFN-1, MFN-2, GRP75, BIP, and IP3R and increased autophagy proteins, LC3 and p62. Equally, the loss of OPA-1 in cells showed an increase in MAM proteins and by ultrastructure had an increase in MAM and autophagosome structures. These data suggests that loss of OPA-1 increased MAM and autophagosome structures, which may lead to decreased muscle mass.

COMPUTATIONAL INVESTIGATION OF ADAPTIVE GAS TURBINE BLADE TECHNOLOGY

***Nikita Kozak** and Dr. Ming-Chen Hsu*
Iowa State University

The objective of this work is to computationally investigate the impact of turbomachinery blade articulation technology on gas-turbine engine performance under off-design conditions. Currently, gas-turbine engines are designed to operate at a single condition with nearly fixed rotor speeds. Operation at off-design conditions causes the turbine blade flow to excessively separate introducing performance degradations, noise, and loss of operability. To address these issues, a novel concept that articulates the rotating turbine blades synchronously with the inlet nozzle vanes is proposed. This concept is investigated using a novel finite element computational fluid dynamics code. The model considers a complex single stage high-pressure turbine geometry operating under gas-turbine combustor exit flow conditions. This study focuses on determining the optimal performance benefits possible by exploring the limits of rotor blade articulation angles, as well as reporting its impact over a broad range of rotor speeds at Army relevant conditions. The key variables of interest include the forces and moments on the blade suction surface, torque, power, and turbine stage adiabatic efficiency. Further, sensitivity analysis based on mesh cell size and uncertainties in boundary conditions is conducted to determine its influence on turbine efficiency. The results show that efficiency increases of up to 10% can be obtained at off-design conditions and provide valuable information for the design of variable speed gas turbine engines and the necessary blade articulation mechanisms that can revolutionize propulsion systems for the US Army Future Vertical Lift (FVL) program.

3D NANOSTRUCTURE PRINTING WITH GRAPHENE INK

***Haley Montgomery**[1], Marilyn McNamara[2], Jingshuai Guo[2], Mohammed Al-Hinai[2], Faisal Al-Masri[2], Amir Niaraki[2], and Dr. Nicole Hashemi[2]*
[1]Des Moines Area Community College
[2]Iowa State University

Due to the innovative properties and potential capabilities of graphene, it has become a substance of interest in many fields of research, such as biomedical engineering, renewable energy, and electronics. Graphene is a 2D non-metal material which is conductive, flexible, strong, bio-compatible and biodegradable. To use graphene in cell culture, it is necessary to create manufacturing procedures to reliably print graphene patterns into applicable forms, theoretically including 3D structures. In this study, graphite was chemically and mechanically exfoliated into a solution of Bovine Serum Albumin (BSA) and water to create graphene, which was then magnetically stirred and sonicated to ensure equal dispersion. The resulting graphene dispersion was printed using an inkjet manufacturing method, and its conductivity was measured in both line and sheet form. Graphene ink patterns were printed with a variety of concentrations onto several substrates, and post-processing methods such as annealing under vacuum, were used to enhance conductivity. Kapton, which can withstand high heat, was modified by plasma cleaning to enhance its hydrophilicity, thereby allowing multi-layer printing to occur. In this way, manipulation of graphite-derived graphene was successfully carried out to print conductive patterns which will have applications in biomedical engineering, as well as other fields.

STUDENT ORAL POSTER ABSTRACTS

MICRO-CHANNEL CANTILEVER SPOTTING (µCS) AND THE IMMOBILIZATION OF CUCURBIT[7]URIL COMPLEX FOR DETERMINATION OF SENSITIVITY ON ANALYTE EXPOSURE

Andres Mora[1], *Philipp Avon*[2], *Dr. Andrea Holmes*[1], *and Dr. Michael Hirtz*[2]
[1]*Doane University, Crete, Nebraska, United States of America*
[2]*Institute of Nanotechnology, Karlsruhe Institute of Technology, Karlsruhe, Germany*

Cucurbiturils (CUs) are macromolecules with a cavity larger in diameter than its opening with ability perform host-guest chemistry, holding molecules without covalent bonds. These guest molecules can change their emitting fluorescent signal when in CUs, enabling the host-guest complexes to function as sensors. The goal of this project was to determine the detection sensitivity of cucurbit[7]uril-berberine complex. Berberine is an extract from the Berberis genus plants that increases in fluorescence emission intensity when introduced in cucurbit[7]uril. To analyze its sensor capability, the complex was immobilized on functionalized glass slide with (3-Glycidyloxypropyl) trimethoxysilane [GPTMS], where the epoxide reacts with the amine-functionalized end from the cucurbit[7]uril-berberine complex, which was characterized by Electrospray Ionization Mass Spectrometry. To deposit the host-guest complex to the functionalized glass slide micro-channel cantilever spotting (µCS), a technique that uses quill-like pens, was used to dispense droplets. These ranged 10 to 20 µm on radius and can be arranged on the substrate, e.g. as a square array. Exposure of the array to different concentration of nandrolone, a steroid that has a greater binding capacity to the cucurbit[7]uril than berberine, resulted in decrease of fluorescence due to the indicator displacement assay (IDA) mechanism. After confirming immobilization using fluorescent microscopy, the array was exposed to nandrolone in different concentrations to quantify the decrease of fluorescence. Immobilization of both of the inks (CB7-Berberine complex and CB7-Pyronin Y complex) onto the GPTMS substrate was successful. Unfortunately, fluorescence signal of the immobilized CB7-Berberine complex was insufficient. Nevertheless, CB7-Pyronin Y was immobilized and visualized.

ESTROGEN POSITIVELY AFFECTS SPATIAL DISCRIMINATION IN FEMALE OVARIECTOMIZED RATS

Raissa Souza[1,2], *Sejal Chudasama, Justin Garrel, Henry Blair, and Jana Veliskova*[2]
[1]*Biology Department, Nebraska Wesleyan University*
[2]*Dept of Cell Biology, New York Medical College*

The dentate gyrus is a part of the hippocampus involved in pattern separation processing. In the hippocampus, there are dendritic spines, which are sites of synaptic plasticity that increase the surface area of neurotransmission and allow the brain to collect new information. Learning and memory are related to a type of synaptic plasticity called long term potentiation (LTP) which means a stronger communication of neurons means better learning. Estrogen modulates hippocampal function. Estradiol plays a role in the dentate gyrus learning process by: regulating spine density, modulating acetylcholine expression, modulating gating function of the DG by selective filtering the frequencies, regulating the NMDA-mediated responses, and vitro slices data show that E2 affects expression in the dentate gyrus suggesting differences in the dentate gyrus function. It is hypothesized that the pattern separation detection depends on the hormonal status. Adult ovariectomized females were used on the experiment. Four to six days after the surgery, animals were assigned to their groups and either injected with 2mg/0.1ml/day of E2 or 0.1ml of oil for 4 days. The animals underwent behavioral spatial environmental and metric testing 24 hours after the last injection. It was hypothesized oil-injected animals would have deficit on separation detection tasks compared to estrogen treated animals. However, this study rejects the hypothesis as estrogen treated animals showed deficits in exploration of the new environment as well as the new position of the objects. This suggests the new information in these tasks may come in frequencies, which are filtered by the dentate gyrus. Future directions include testing animals at the water maze and have animals to be trained and receive an estrogen replacement therapy for a longer period of time.

STUDENT POSTER ABSTRACTS

1. ELECTROSTATIC GENERATION

Sandro Aldana
Doane University

The problem was to find a new way of power generation through the use of the triboelectric effect. Throughout the summer, many experiments were done to figure out the best materials to cause a large reaction for the tribolelectric effect, to better understand the triboelectric effect, and to see where this type of technology is heading to. New information was found regarding the triboelectric effect in its uses of power generation. At the end, a prototype was created and tested to prove certain theories. After these theories were proven true by experiments through the use of the prototype the final step was to develop a new problem to be framed so that a new iteration could then be built to provide more data.

2. ANALYSIS OF LEISHMANIA AND CRITHIDIA GROWTH PATTERNS IN VITRO: DETERMINING CONDITIONS NEEDED TO UTILIZE A CRISPR/CAS9 SYSTEM FOR PROTOZOAN RESEARCH IN A BSL1 ENVIRONMENT

Ali Ali[1]*, Andrew Linkletter*[1]*, Patricia Storlie*[1]*, and Mary Wilson*[2]*.*
[1]*Wartburg College*
[2]*University of Iowa Carver College of Medicine*

Drug Selection experiments were performed on various Leishmania cell lines as a preliminary test of the effectiveness of certain selection markers. We then transfected Crithidia to express Cas9 in order to establish a BSL1 model system to utilize CRISPR/Cas9. A guide RNA (gRNA) was identified and analyzed to target a surface protein of interest. We are in the process of cloning this gRNA into a Leishmania specific plasmid which will be expressed episomally in our Crithidia-Cas9 cell line

3. AN EVALUATION OF MONITORING TECHNOLOGIES TO FACILITATE THE DEVELOPMENT OF ARTIFICIAL PANCREAS

Adiu Arou[1]*, Mauricio Sandavol*[2]*, Yong Mei*[3]*, and Derrick Rollins*[3]
[1]*Marshalltown Community College*
[2]*Des Moines Area Community College*
[3]*Iowa State University*

Type 1 diabetes (T1D) is a result of the inability of the pancreas to produce insulin. As a consequence, individuals with this condition become dependent on exogenous insulin. Although exogenous insulin can compensate for the lack of insulin, the amount has to be carefully determined before injection. People with T1D can estimate the amount of insulin required after meals using a glucose lancet meter. However, several factors apart from the consumed meal can affect blood glucose concentration (G). Consequently, there is a need for constant monitoring of G and other significant factors that affect G to maintain euglycemia (70-180 mg/dL G) for people with T1D. The concept of "artificial pancreas", an automatic insulin delivery system, has been brought up and is widely used. To use an automatic delivery system, inputs affecting G must be accounted for in an accurate manner. In this research, we looked into activity monitors that measure emotional stress, activity, sleep quality, etc. The goal was to find a monitor that could send information to a smartphone. We are evaluating the Apple watch to see if it is a good choice as a monitor. Using Apple Watch sensors, we will be able to detect variables such as activity, sleep behavior, stress, nutrition, blood pressure, and energy expenditure. The main goal is to synchronize information from the glucose sensor and the activity monitor and feed it to the feedforward predictive control (FFPC) algorithm on the smartphone.

4. UNDERSTANDING PATHOGEN PERSISTENCE IN SOIL THROUGH A TERRARIUM EXPERIMENT

Glorie Borsay[1] *Megan Lindmark*[2]*, Kevin Tsai*[3]*, and Kelly K. Baker*[3]
[1]*The University of Iowa, Global Health Studies*
[2]*The University of Iowa, Department of Civil and Environmental Engineering*
[3]*The University of Iowa, Department of Occupational and Environmental Health*

Though there are numerous studies measuring the length of time pathogens persist in wastewater environments; pathogen persistence in the soil of tropical environments is relatively poorly understood. To better understand pathogen persistence in soil, we have created a terrarium that mimics a tropical environment. Soil from Kenya will be used in this experiment, as well as Enterotoxigenic Escherichia coli (ETEC) since it is a common water and soil borne pathogen that causes disease. To better understand how pathogen survives in the soil, we will spike a known amount of live ETEC, inactive ETEC, and DNA into separate beakers of soil in the terrarium. Then we will sample the soil from those beakers over time. Separate beakers will be used for each sampling point and each designation of ETEC. We will then perform quantitative PCR which allows us to see how much soil survived over time. Eventually, we will repeat this experiment with dangerous pathogens like shigella. This novel experiment will help narrow the gap in research regarding pathogen persistence in soil over time. The results from this experiment can help develop knowledge around understanding pathogen persistence in soil, which is critical for improving public health research.

5. WIRELESS RESONANT SENSORS FOR CONVENIENT, REAL-TIME CELL DENSITY MEASUREMENT

Morganne Borsh, *Ande Beierle, Nathan Munn, Denis Tamiev, and Dr. Nigel Reuel*
Iowa State University

Cells can be modified to produce chemical precursors of economic significance. The amount of product is directly proportional to the amount of cells. Current procedures used in measuring cell growth require many samples taken from the culture flask—compromising sterility, interfering with growth, and risking spillage. New methods, such as Lifeonics Smart Measuring Optical Device (SMOD), allow for real-time cell culture monitoring, nearly eliminating such problems. This cutting-edge smart sensor gathers temperature and optical density (OD) measurements from within the flask. New approaches, like SMOD, aren't without limitations: interference can still affect the sensors, they need to be recharged, and they can not measure more than two aspects of a culture. In this project we demonstrate how wireless resonant sensors can be used for cell density measurement. Resonant sensors are able to transduce changes in the local dielectric by shifting their resonant frequency response; this is then recorded and analyzed. Considering this, we established a liquid culture of bacterial cells. Upon dilution of the overnight culture, the OD and frequency were recorded via a bench-top spectrophotometer and vector network analyzer (VNA), respectively. After four hours, with a sample taken every

fifteen minutes, a generalized growth rate was developed. A new sensor—allowing for more media to be tested—was developed, and the results exhibited a satisfactory growth curve. A 3D-printed design supporting a Bluetooth VNA within the incubator was developed. This wireless set-up aims to eliminate complications and allow real-time data to be collected without stopping the incubation process.

6. INCREASING GLUCOSE UPTAKE IN MITOCHONDRIAL PYRUVATE CARRIER DEFICIENT HEARTS IMPROVES CARDIAC HYPERTROPHY

Romilia Tatiana Castilo[1]*, Young Do Koo*[1]*, Yuan Zhang*[1]*, James Cox*[2]*, Jared Rutter*[3]*, E. Dale Abel*[1]
[1]*Fraternal Order of Eagles Diabetes Research Center, University of Iowa, Iowa City, IA 52242*
[2]*Metabolomics core, University of Utah, Salt Lake City, UT 84112*
[3]*Department of Biochemistry, University of Utah, Salt Lake City, UT 84112*

Pyruvate is a critical metabolic intermediate linking glycolysis and glucose oxidation. The mitochondrial pyruvate carrier (MPC) transports pyruvate into the mitochondrial matrix for further oxidation. To test the hypothesis that a mismatch between glucose oxidation and glycolysis leads to cardiac dysfunction, we generated a mouse model with inducible cardiomyocyte-restricted deletion of MPC1 (icMPC1-/-). The alphaMHC-driven rtTA combined with a doxycycline-activated tetON-CRE system was employed to delete the MPC1 gene in mouse hearts at the age of 6 weeks. Loss of MPC in cardiomyocytes during adulthood leads to dilated cardiomyopathy 14 weeks after the doxycycline induction. Metabolomics analysis performed on the icMPC1-/- hearts revealed increased pyruvate (2.74-fold, $p<0.005$) and lactate (1.69-fold, $p<0.05$), as well as glycolytic intermediates including 3-phosphoglycerate (1.32-fold, $p=0.05$) and 2-phosphoglycerate (1.37-fold, $p<0.05$). To further investigate if increasing the accumulation of glycolytic intermediates would exacerbate cardiac remodeling, icMPC1-/- mice were used to crossbreed with doxycycline-inducible GLUT1 overexpression transgenic mice to generate KO/TG mice. The KO/TG mice developed less severe cardiac hypertrophy after 20 weeks of induction, as evidenced by decreased heart weight to body weight ratio (KO/TG vs iCMPC1-/-, 14.46±1.22 vs 8.40±0.12, $p<0.05$). Ejection fraction and LV mass were also improved than those of cMPC1 KO mice by GLUT1 overexpression. These data support that pathological cardiac hypertrophy by cMPC1 deficiency in the heart could be improved by activation of glycolytic pathway.

7. SEX DIFFERENCES IN THE RESPONSE OF C57BL/6 MICE TO KETOGENIC DIETS

Jesse Cochran*, Paul Taufalele, Kevin Lin, Yuan Zhang, Rhonda Souvenir, Antentor Hinton Jr., and E. Dale Abel*
The University of Iowa

Since the initial use of ketogenic diets (KD) as adjunctive treatment for epilepsy, these diets are being increasingly used to promote weight loss and to reduce the risk of metabolic sequelae of severe obesity. Typical KD are very low in carbohydrate and high in fat, promoting hepatic production of ketone bodies. Most animal studies tend to be performed in male mice, and few studies have evaluated gender differences in response to KD. To explore sex differences in response to KD, female and male wild-type mice on the C57BL/6J background were fed either a control diet (CD- 7% fat, 47% carb., 19% protein) or KD (75% fat, 3% carb., 8% protein), following weaning. Females on the CD manifested higher levels of circulating β-hydroxybutyrate (β-HB) than males (2.86-fold, $p<0.05$). Circulating β-HB concentrations increased with KD in males and females (1.30-fold & 5.05-fold, $p<10\text{-}4$ & $p<0.01$ respectively) with higher concentrations in females. After 15 weeks of feeding, females on KD displayed an increase in body weight (1.07-fold KD vs. CD, $p<0.05$) while body weight declined in males (0.88-fold, $p<0.05$). Nuclear magnetic resonance (NMR) analysis revealed elevated lean mass in 18-week old females (1.07-fold, $p<0.05$), but a significant reduction in fat mass in males (0.49-fold, $p<0.05$) relative to sex-matched mice on CD. The female mice on KD developed impaired glucose tolerance with a 1.35-fold increase in glucose tolerance test area under the curve (GTT AUC) ($p<0.001$) relative to CD females. In contrast, fasting glucose levels were lower in males on KD (131.8 ± 12.5 mg/ dl vs. 169.2 ± 6.3 mg/dl, $p<0.05$). Despite no significant change in GTT AUC, the male mice on KD displayed elevated blood glucose concentrations 30 minutes after injection relative to males on CD (344.9 ± 18.7 mg/ dl vs. 272.0 ± 10.31 mg/ dl, $p<0.05$). However, after 120 minutes, blood glucose levels returned to initial levels. To further investigate the role of estrogen in this sexual dimorphism, female mice were ovariectomized (OVX) and randomized to receive either a CD or KD after weaning. At 15 weeks old, OVX mice on KD displayed decreased body weight (0.84-fold, $p<0.0001$) and fat mass (0.65-fold, $p<0.001$) relative to CD-fed mice. Despite changes in body composition, OVX mice on KD still exhibited impaired glucose tolerance with a 1.4-fold increase in GTT AUC comparable to OVX mice on CD ($p<0.05$). In conclusion, significant sex differences exist in terms of body composition and metabolism in response to ketogenic diet, which may partially be attributed to estrogen.

8. CELL STARVATION LEADS TO DECREASE IN SIZE OF EXOSOMES FROM PROSTATE CANCER CELLS

Victoria Eniola[1]*, Lei Zhao*[2]*, and Michael D. Henry*[2]
[1]*Kirkwood Community College*
[2]*The University of Iowa Carver College of Medicine*

Exosomes, which range from 30nm to 150nm in size, are the extracellular vesicles (EV's) that are secreted from cells and contain important information such as proteins, lipids, mRNA, and miRNA. They are heavily involved in intercellular communication between the different cell types, and play an important role in the way tumor cells communicate.
In our previous study, we found that components of autophagic flux were found in exosomes; starvation is a well known inducer of cell autophagy. Therefore, we would like to investigate if starvation-induced autophagy will lead to changes in the size or number of exosomes. When starvation occurs, exosomes from prostate cancer cells show a decrease in size.

9. IMPACT OF CLOTHING COLOR AND LAND-USE HISTORY UPON THE BEHAVIOR OF WATER ANOLES (ANOLIS AQUATICUS)

Andrea Fondren[1]*, Lindsey Swierk*[2]*, and Breanna J. Putman*[3,4]
[1]*Iowa State University, College of Agriculture and Sciences, Ames, IA, USA*
[2]*Binghamton University, State University of New York, Department of Biological Sciences, Binghamton, NY, USA*
[3]*University of California, Department of Ecology and Evolutionary Biology, Los Angeles, California, USA*
[4]*Natural History Museum of Los Angeles County, Section of Herpetology and Urban Nature Research Center, Los Angeles, California, USA*

Identifying how ecotourism affects wildlife can lower its environmental impact. Human presence is inherently associated with ecotourism, which can impact animal behavior because animals often perceive humans as predators and, consequently, spend more time on human-directed antipredator behaviors and less on other fitness-relevant activities. We tested whether human clothing color affects water anole (Anolis aquaticus) behavior at a popular ecotourism destination in Costa Rica. We examined if clothing resembling the primary sexually selected signaling color (SSSC) (orange) of Anolis lizards reduces the likelihood of anoles performing human-directed antipredator behaviors, as predicted by the species confidence hypothesis. Research teams mimicked an ecotourism group by searching for anoles wearing one of four T-shirt treatments: orange, green, blue, or mixed (i.e., each wore a different color). We conducted surveys at sites with different land-use histories: primary forest, secondary forest, and abandoned pasture. Wearing orange clothing resembling water the anole SSSC resulted in more sightings and greater capture rates compared to blue or green, and anole responses did not differ between blue and green treatments. We also noted fewer anole sightings in abandoned pasture than in forested habitats, which suggests enhanced antipredator responses and/or lower abundance/density in abandoned pasture. We demonstrate that colors "displayed" by perceived predators (i.e., humans) alter antipredator behaviors in water anoles. Clothing choice could have unintended impacts on wildlife in natural areas, and wearing colors resembling the SSSC might enhance tolerance toward humans. Incorporating this knowledge in ecotourism excursions or biological surveys could reduce stress and increase sightings of target species.

10. PURKINJE CELL-SPECIFIC ABLATION OF CREB INCREASES ALCOHOL-INDUCED NEURONAL LOSSES IN THE CEREBELLUM

Taha Gesalla*, D. Todd, M. Clapp, A. Mulcahey, P. Danes, B. Karacay, and DJ Bonthius*
The University of Iowa

Children with fetal alcohol spectrum disorders often exhibit ataxia. This finding often coincides with gross damage to the cerebellum. Alcohol treatment in rodents over PD4-9 causes the loss of both cerebellar granule cells and purkinje cells. Purkinje cells are especially vulnerable. Several different second messenger systems converge on the transcription factor CREB. When CREB is phosphorylation, it up-regulates several protective genes against alcohol. Hypothesis: Removal of CREB in the Purkinje cells will increase neuronal losses in the cerebellum.

11. INTERNSHIP AT A MORGUE

Zory Hamblin[1] *and Dr. Snell*[2]
[1]*Upper Iowa University*
[2]*Sanford Health Pathology Clinic*

During the summer of 2018, I had an internship experience at Sanford Health Pathology Clinic in Sioux Falls, SD. I chose this internship opportunity because I wanted to learn more about the workings of a pathology clinic, and also to see if it was the right future career for me. In the clinic, I observed and assist twenty-five different autopsies, including suicide, gunshot or shotgun wounds, natural or accidental death, and homicide. The internship allowed me multiple opportunities for hands-on experience; for example, using the saw to open the rib cage, weighing the organs and cutting open the skull. I additionally practiced dissecting techniques including the kidneys, the process of cutting into the skull to get the brain and also the pituitary gland. The benefits I've gained through this internship experience, such as exposure to the techniques and the hands-on experience, will greatly help me with my future career. However, many individuals don't know what a forensic pathologist does in the morgue and why they are important in today's society. In addition, teaching others about my internship experience and some of the autopsies would help others have a better understanding of forensic pathology.

12. THE IMPACTS OF GOAT GRAZING ON INVASIVE SAND PRAIRIE PLANT SPECIES

Hillery Hartwig
Augustana College

Nahant Marsh is one of the largest urban wetlands on the Upper Mississippi River, located in Southwest Davenport, Iowa. Among the marshy areas and bottomland forest, the wetland also contains mesic, wet, and sand prairies. The restoration of prairie ecosystems across North America is imperative to their conservation, due to the loss of almost 200 million acres of prairies and grasslands across the United States. Two areas of the sand prairie at Nahant Marsh were used to observe the effect of goat grazing as a restoration practice, in an area of tree encroachment. A 10 meter transect line was set up through the middle of both the control and experimental areas of the sand prairie. Before the goats were introduced to the experimental area, a pre-survey was done along the transects using a square-meter. At every other even meter, plants that fell within a square meter of the transect line were counted and identified. After the goats had grazed the experimental area for two weeks, a post-survey was done in the same way. Additionally, the evenness and diversity index of each transect was calculated. The data showed that there was an overall increase in evenness and decrease in diversity of the plant species in the prairie after goat grazing. The goats grazed and trampled both invasive and native species. It was concluded that goat grazing may best be utilized as a restoration strategy when combined with other management strategies, such as controlled burning or manual removal of invasive species.

13. ISOLATION AND CHARACTERIZATION OF BACTERIOPHAGES ELPIDA AND MAGELLAN

Audrey Hayes *and* ***Thanh Nguyen***
Nebraska Wesleyan University

During the Fall of 2018, students at Nebraska Wesleyan University participated in the Science Education Alliance

Phage Hunters Advancing Genomics and Evolutionary Sciences (SEA-PHAGES) program. Each student had the opportunity to isolate a bacteriophage (virus that infects bacteria) from the soil and characterize it. Once the bacteriophage, or phage for short, was isolated, the phage was purified so that only one type of phage was present. This was indicated by a consistent plaque morphology on a bacterial lawns of the host bacterium Microbacterium paraoxydans NWU1. Once purified, the phage was observed using electron microscopy and further characterized based on its morphology. In addition, DNA was isolated from the phage and will be sequenced. Once sequenced, the genome of the virus will be annotated using the computer program DNA Master and other online annotation tools. Our discoveries will help characterize more phages and add to those already found in the phages database (phagesdb.org). By continuing the discovery of bacteriophages, more beneficial uses of phages can be found. These include: their use as an alternative to antibiotics, treatment of genetic diseases, as a source of enzymes, and as a natural pesticide (Carter & Saunders, 2007).

14. PEER HEALTH COACHING FOR PHYSICAL ACTIVITY, SELF-EFFICACY, AND STRESS IN COLLEGE STUDENTS

Kylee Joiner, *Kathryn DeShaw, Gregory J. Welk*
Department of Kinesiology, Iowa State University

Purpose: Motivational Interviewing (MI) is a directive, client-based technique used within health coaching (HC) to elicit motivation for behavior change. The purpose of this study is to compare physical activity (PA) levels, PA-related self-efficacy (SE) for making time (MTSE) and sticking to PA (STSE), and stress levels pre and post receiving peer HC sessions. We hypothesize that receiving peer HC would improve PA and SE levels, and reduce perceived stress levels. Methods: Incoming undergraduate students (age 18.9 ± 0.9; 79% female) were recruited to participate in this study (n=38). Participants were part of a larger study that encompassed a self-directed goal setting protocol, with this sub-sample of participants self-selecting PA as their primary goal. Participants completed surveys pre and post 8 weeks of HC, 4 sessions total, to assess PA, SE, and stress. PA, SE and stress levels were assessed via the International Physical Activity Questionnaire Short-Form, Exercise and Confidence Survey, and the Perceived Stress Scale, respectively. Statistical analyses included paired samples t-tests to examine pre and post differences, and Cohen's d effect sizes. Results: Total PA significantly increased from baseline to follow up (99.4 ± 47.6 minutes/week vs. 135.8 ± 83.9 minutes/week) ($p < 0.01$), resulting in a moderate effect size (d=0.53). MTSE significantly increased from baseline to follow up (3.4 ± 0.7 vs. 3.9 ± 0.7) ($p < 0.01$; d=0.71) along with STSE (3.5 ± 0.8 vs. 4.0 ± 0.6) ($p < 0.01$; d=0.71); both producing large effects. Stress levels also significantly decreased (19.5 ± 6.2 vs. 15.1 ± 6.0; $p < 0.01$) resulting in a large effect (d=0.72). Conclusion: HC seems to be an effective source of accountability to increase PA and SE and reduce stress for incoming college students. Future research should focus on the degree to which HC maintains improved lifestyle behavior habits long-term.

15. COMPARISON ON EFFECT OF METAL ON ANISOTROPY OF BEAM GROWTH

Paul Karanja[1]*, Boyce Chang*[2]*, Giovanni Rodriguez*[2]*, Martin Thuo*[2]
[1]*Mechanical Engineering Iowa State University,*
[2]*Department of Material Science and Engineering, Iowa State University*

Porous metal oxides with molecular sized periodic structures have attracted a lot of attention due to their range of application in storage and transformation of small molecules. More application includes indium nanoparticles in production of transparent conductive coatings in electronics. (1) Owing to its band gap of 3.4 -3.7 eV indium oxide is an n-type semiconductor especially when doped with tin, forming tin oxide. Production of indium oxide is difficult and expensive when methods such as sol gel and electrolytic refining are employed. We produce porous oxides by forming metal organic coordination polymers continuously etching metal particles. The coordination polymer formed is heat treated through which organic content is eliminated to form a porous material. We demonstrate that the absorptive properties and morphology of the material can be tuned by varying temperature. X-ray diffraction is also employed to ascertain the changes in crystal structure.

16. INSULIN STIMULATION INCREASES ER-MITO CONTACTS

Jake "Leo" Kazma*, Ariana Dewan, Margaret Mungai, Benjamin Kirk, Yahang Li, Serif Bacevac, Antentor Othrell Hinton, Jr., Renata Pereira Alambert, and E. Dale Abel*
The University of Iowa

Mitochondria and Endoplasmic Reticulum (ER) Contact sites (MERCs) are regions within a cell where mitochondria and ER come into proximity. MERCs are enriched with specific proteins and lipids that aid in specialized structural rearrangements of this region for the management of numerous cellular processes, such as the regulation of mitochondrial morphology and are critical for the prevention of disease states such as diabetes. Additionally, it also has been shown that MAM integrity is needed in the cell to maintain insulin sensitivity. Therefore, we hypothesize that insulin stimulation can increase MAM interactions. To test this hypothesis, we surveyed for several MERCs proteins after 2 hours on insulin stimulation. We found that MAM proteins AKT, MTOR, and MFN-2 were altered after insulin stimulation in primary myotubes. Next, we utilized TEM analysis to determine if insulin stimulation increased the number of MERCs. Analysis of TEM demonstrated mitochondria were more fused, had more cristae, and had an increase number of MERCs after insulin stimulation. Collectively, these data suggest that insulin stimulation may activate an IR-AKT-MTOR dependent mechanism that regulates number of MERCs in a cell.

17. OPA-1DEFICIENCY PROMOTES MUSCLE ATROPHY THROUGH UPREGULATING ER-MITO CONTACTS AND AUTOPHAGY

Benjamin Kirk*, Margaret Mungai, Yahang Li, Jake "Leo" Kazma, Serif Bacevac, Antentor Othrell Hinton, Jr., Renata Pereira Alambert, and E. Dale Abel*
The University of Iowa

Type 2 Diabetes in some patients has been shown to have dysregulated Mitochondria Associated Membranes (MAMs)

and decreased muscle mass. MAMs are enriched with specific proteins and lipids that aid in specialized structural rearrangements such as the formation of autophagosomes. Decreased optic atrophy protein-1 (OPA-1) in skeletal muscle has been reported in both murine and human type II diabetic models. Loss of OPA-1 in skeletal muscle has been observed to cause muscle atrophy and increase mitochondria associated membrane-tethering protein, MFN-2. Therefore, we hypothesized that OPA-1 deficiency increases muscle atrophy through a MAM-Autophagosome Interaction (MAI). To investigate the role of OPA-1 on MAI, studies were performed in mice that had OPA1 silenced in skeletal muscle and in satellite cells isolated from floxed OPA-1 mice that were infected with adenoviral Cre recombinase to delete OPA1. Ablation of OPA-1 in skeletal muscle increased the following MAM proteins: MFN-1, MFN-2, GRP75, BIP, and IP3R and increased autophagy proteins, LC3 and p62. Equally, the loss of OPA-1 in cells showed an increase in MAM proteins and by ultrastructure had an increase in MAM and autophagosome structures. These data suggests that loss of OPA-1 increased MAM and autophagosome structures, which may lead to decreased muscle mass.

18. COMPUTATIONAL INVESTIGATION OF ADAPTIVE GAS TURBINE BLADE TECHNOLOGY

Nikita Kozak *and Dr. Ming-Chen Hsu*
Iowa State University

The objective of this work is to computationally investigate the impact of turbomachinery blade articulation technology on gas-turbine engine performance under off-design conditions. Currently, gas-turbine engines are designed to operate at a single condition with nearly fixed rotor speeds. Operation at off-design conditions causes the turbine blade flow to excessively separate introducing performance degradations, noise, and loss of operability. To address these issues, a novel concept that articulates the rotating turbine blades synchronously with the inlet nozzle vanes is proposed. This concept is investigated using a novel finite element computational fluid dynamics code. The model considers a complex single stage high-pressure turbine geometry operating under gas-turbine combustor exit flow conditions. This study focuses on determining the optimal performance benefits possible by exploring the limits of rotor blade articulation angles, as well as reporting its impact over a broad range of rotor speeds at Army relevant conditions. The key variables of interest include the forces and moments on the blade suction surface, torque, power, and turbine stage adiabatic efficiency. Further, sensitivity analysis based on mesh cell size and uncertainties in boundary conditions is conducted to determine its influence on turbine efficiency. The results show that efficiency increases of up to 10% can be obtained at off-design conditions and provide valuable information for the design of variable speed gas turbine engines and the necessary blade articulation mechanisms that can revolutionize propulsion systems for the US Army Future Vertical Lift (FVL) program.

19. EFFECTS OF PERSPECTIVE ON SUBJECTIVE AND PHYSIOLOGICAL RESPONSES TO NARRATIVES INVOLVING PHYSICAL AND EMOTIONAL PAIN

Amanda Corona, Kristina Humphreys, ***DaeNia La Rodé,*** *Heidi Storl, & Ian Harrington*
Augustana College

Perspective taking requires an ability to infer the mental states of others, underlies important aspects of social interaction, and is thought to involve neural networks including the temporal parietal junction (TPJ; Decety et al., 2006; Steinbeis, 2016). In this study we were interested in how participants would respond to narratives involving physical and emotional pain written in the second- (i.e., about them) or third- (i.e., about others) person perspective. We also wanted to know how participants' levels of dispositional empathy related to their subjective ratings of discomfort and physiological arousal in response to the narratives. Each participant listened to eight narratives presented via headphones representing one of each combination of painful/non-painful, emotional/physical, and second-person/third-person. Skin conductance was measured continuously and participants provided subjective ratings of discomfort using a 7-point scale after each story. Emotional empathy was measured with the Multi-dimensional Emotional Empathy Scale (MDEES, Caruso & Mayer, 1998). Restricting analyses to the painful narratives, there was a significant interaction of story type (emotional/physical) and perspective (second-person/third-person) on subjective ratings of comfort. Second-person emotional pain was rated similarly to second- and third-person physical pain, whereas third-person emotional pain was rated as more comfortable. In short, participants seemed to discount the emotional pain of others and elevate their own emotional pain to the status of physical pain. We then used the subscales of the MDEES to predict subjective and physiological responses to stories using multiple regression. Several subscales, including positive sharing and suffering, were able to predict subjective responses to physical but not emotional pain, and the subscales emotional attention and feeling for others were able to predict physiological arousal in response to third-person emotional and physical pain, respectively. These findings indicate that perspective taking can be manipulated with simple narratives and that individual differences in emotional empathy can have consequences for how people respond to reports of the pain of others

20. A SCREEN OF MAMMALIAN PROTEINS FOR INSULATOR ACTIVITY IN SACCHAROMYCES CEREVISIAE

Joe Larkin, Keegan Whisler, *Nicholas Scalora, and Brett Schofield*
Department of Biology, Doane University

Insulator proteins shelter genes from the spread of repressive heterochromatin histone markers, like H3K9 trimethylation along a chromatin fiber. Heterochromatin is tightly compacted DNA that allows for little to no transcription to occur, while genes located within regions of euchromatin can be readily transcribed and expressed. Although a number of insulator proteins have been identified in the budding yeast Saccharomyces cerevisiae, the only mammalian protein identified with insulator properties is CTCF. However, it is widely believed that other mammalian proteins can serve that function. Chromatin architectural proteins like CTCF organize DNA into specific three-dimensional conformations and

thus serve as excellent candidate proteins for insulator activity. This current research seeks to test several of these chromatin architectural proteins for insulator activity in S. cerevisiae. In this assay, candidate proteins are directed to a region of DNA between a telomere and a sub-telomeric gene, which is normally silenced through the telomere position effect. Specific DNA binding is achieved through a fusion of the candidate protein and the Gal4 DNA binding domain. Insulator proteins will allow the sub-telomeric gene to be expressed while non-insulators will have no effect on its activation. The yeast insulator protein Reb1 was used as a positive control, while the Gal4 DNA binding domain alone served as a negative control.

21. DIVISIONS OF SOMATOSENSORY CORTEX IN A MOUSE MODEL OF AUTISM

***Rikki S. Laser**, James C. Dooley, Cassandra Coleman, Greta Sokoloff, Mark S. Blumberg.*
The University of Iowa

Myoclonic twitches are small, jerky movements of the limbs that occur exclusively during Rapid Eye Movement (REM) sleep, the most abundant type of sleep in infancy. Twitches are thought to contribute to the typical development of somatosensory processing. It follows that abnormalities in the quantity and patterning of twitches may provide insights into neurodevelopmental disorders characterized by somatosensory deficits, including autism. One model of this disorder is the 16p11.2 del/+ mouse, which captures some of the somatosensory abnormalities that often accompany autism in humans. Although previous work has indicated that these mice exhibit a deficit in twitching during the first postnatal week, how this deficit affects the somatosensory system has not yet been explored. Primary somatosensory cortex (S1) processes sensory information of the entire body in an orderly, somatotopic fashion. This somatotopy can be visualized and quantified using cytochrome oxidase staining. By measuring and comparing portions of S1 between wild-type and 16p11.2 del/+ mice, we can reveal whether the deficit in twitching that we have observed in the 16p11 mice occurs alongside changes to the organization of S1. One aim of this work is to provide clues to the mechanisms underlying the sensory deficits in autism.

22. THE EFFECT OF LEAD (PB) ON BRASSICA RAPA GERMINATION AND NICOTIANA BENTHAMIANA GROWTH

***Han Le**, Payton Alber and Dr. Adrianne Prokupek-Pickett*
Nebraska Wesleyan University

Past research and studies on the effects of lead have shown that "higher concentration of lead supplied to the plant results not only retarded germination and growth of the seedling of many plants but also decreased the chlorophyll level and the activity of nitrate reductase enzyme also" (Sengar et al., 2008). Lead is not biodegradable and is extremely persistent in both water and soil. Lead can be retained in the environment for 150–5000 years (Fahr, 2013). Additionally, heavy metals as lead can cause bioaccumulation affecting the entire ecosystem and pose harmful health consequences in all life forms. (Ghosh & Sethy, 2013). Although lead has no biological function, recent research has suggested that lead may affect protein folding and cell viability (Tamás et al, 2014). This experiment will strengthen the comprehension of the effect of heavy metal on plants by studying the correlation between concentration of lead and germination of Brassica rapa and growth of Nicotiana benthamiana.

23. MITIGATION OF PRRS TRANSMISSION WITH UV LIGHT TREATMENT OF BARN INLET AIR: PROOF-OF-CONCEPT

***Peiyang Li** and Dr. Jacek Koziel*
Iowa State University

My research project focuses on improving biosecurity of animal production by eliminating the spread of Porcine Reproductive and Respiratory Syndrome (PRRS) airborne virus, the most destructive disease affecting the swine industry in the U.S. and especially in Iowa (#1 swine-producing state). A novel approach to treat PRRS is to use ultraviolet light to inactivate the virus and prevent it from spreading from farm-to-farm. This project represents the initial phase of designing and building an apparatus for the mitigation of PRRS transmission with UV light treatment of barn inlet air at the proof-of-concept stage. Three UV lights, black light UV-A, "excimer" UV-C (207-222 nm), and conventional UV (254 nm) will be tested for their germicidal effectiveness in terms of contact time, light intensity, electric power input, and other practical considerations for on-farm use to eliminate PRRS virus. For UV-A and UV-C, the evaluation will also be based upon their feasibility for barn inlet air treatment in pilot scale. It is significant that the economic analysis will be conducted to prove the advantage of UV light treatment (including cost savings) over currently used HEPA filtration.

24. TURTLE UTILIZATION OF FLOATING WETLANDS AT NAHANT MARSH

Nicholas Martinez
Augustana College

Nahant Marsh is a 123-hectare urban wetland city preserve located on the upper Mississippi river in Southwest Davenport Iowa. This wetland contains over six different artificial floating wetlands. Floating wetlands are large rectangles of pours material that float around in the marsh and proved a place for animals to bask and plants to live. Previous research suggested that the use of floating wetlands by turtles varies throughout the day, but little known about the hours of peak use by turtles. In July 2018, I used time lapse photography to document the time and duration of use by turtles on one floating wetland at Nahant Marsh. Image recording was conducted on 16, 20, 23, 25, and 27 July 2018. I used a GoPro Hero 4 camera and configured it to a time lapse setting of one photo every sixty seconds. I suspended the camera 1.7 meters above the floating wetland and pointed it downward to capture turtle activity. Recording began between 9 a.m. and 11 a.m. and data were recorded for twenty-four hours. I collected the camera the following day and analyzed the images. Number of turtles were recorded by hand and entered into excel. I found that turtle utilization of floating wetland was highest at 2:30pm with an average number of 5 turtles present on the wetland. The species of turtles found were Trachemys scripta elegans, Chrysemys picta, Apalone spinifera. I also found that turtles would gather in groups on the wetland and bask in the sun.

25. SOMETHING TASTES FISHY: CORRELATION BETWEEN FEEDING MORPHOLOGY AND DIET IN KINGFISHERS

Lauren Mellenthin[1]*, Shannon Hackett*[2]*, and Chad Eliason*[2]
[1]*Iowa State University*
[2]*The Field Museum of Natural History*

Diets of birds may be associated with their taste receptors, depending on choices of food and foraging behavior. Following studies showing that fish-eating penguins have a nonfunctional "umami" taste gene, we will explore the relationships between genetic and genic changes in taste receptor genes and the morphology of the tongue and beak in kingfishers. Kingfishers are a model group of organisms to study because they have a well resolved species-level phylogeny, diverse beak shapes, feeding behaviors, and diets. Because fish-eating has evolved multiple times in the history of the group, we have replicates to explore the relationship between genic and genetic change, diet, and behavior. Our morphometric analyses include geometric morphometrics on computed tomography (CT) scanned birds to quantify shape and compare across species. For molecular analysis, we will assess genes associated with taste and diving behaviors such as vision and muscle characters. We will target 200 genes and compare across the kingfisher genome generated at the Pritzker laboratory and the genomes of birds throughout the tree of life to better understand sensory evolution. We will then use the aligned 200 gene matrix to develop probes that will enable us to use next-generation sequencing technologies to sequence these genes across 30 species of kingfishers in Field Museum collections. The results will help us to understand how behavior and environment affects the morphology and genetics of sensory systems and how these may have changed over evolutionary time.

26. FORENSIC ANALYSIS OF ORGANIC GUNSHOT RESIDUE

Emy Moreno[1]*, Michaela Rich*[1]*, and Curtiss Hanson*[2]
[1]*Hawkeye Community College*
[2]*University of Northern Iowa*

Analysis of gunshot residue (GSR) has become the standard forensic marker for the discharge of a firearm. Traditional analysis of gunshot residue is based on the analysis of the particulates formed from the metallic components of the ammunition that vaporize during discharge and then deposit on materials nearby. Interest in the analysis of the organic products produced by the discharge of the ammunition has increased. This information is highly specific to the propellant used in the ammunition. A database of the pyrolysis products by different powders would provide a mechanism for the identification of specific ammunition. This type of forensic evidence could link the manufacturer of the ammunition to the specific cartridge used. A potential problem associated with OGSR analysis is the volatility of the compounds produced. Organic compounds have a short lifetime compared to the non-volatile metal particulates resulting in a limited window for forensic identification. This volatility however also provides an important opportunity for the timeline of the discharge. Because the abundance of a volatile compound is inversely proportional to the evaporation time, the database of compounds could provide an analytical method to determine the timeframe of the discharge. This information is potentially even more useful when analyzing the residue that remains on the casing of a discharged cartridge. Theoretically, by analyzing the organic compounds that remain on a spent casing, information can be obtained that when compared to a standard database will identify both the powder used as well as the approximate time of the discharge.

27. 3D NANOSTRUCTURE PRINTING WITH GRAPHENE INK

Haley Montgomery[1]*, Marilyn McNamara* [2]*, Jingshuai Guo*[2]*, Mohammed Al-Hinai*[2]*, Faisal Al-Masri*[2]*, Amir Niaraki*[2]*, and Dr. Nicole Hashemi*[2]
[1]*Des Moines Area Community College*
[2]*Iowa State University*

Due to the innovative properties and potential capabilities of graphene, it has become a substance of interest in many fields of research, such as biomedical engineering, renewable energy, and electronics. Graphene is a 2D non-metal material which is conductive, flexible, strong, bio-compatible and biodegradable. To use graphene in cell culture, it is necessary to create manufacturing procedures to reliably print graphene patterns into applicable forms, theoretically including 3D structures. In this study, graphite was chemically and mechanically exfoliated into a solution of Bovine Serum Albumin (BSA) and water to create graphene, which was then magnetically stirred and sonicated to ensure equal dispersion. The resulting graphene dispersion was printed using an inkjet manufacturing method, and its conductivity was measured in both line and sheet form. Graphene ink patterns were printed with a variety of concentrations onto several substrates, and post-processing methods such as annealing under vacuum, were used to enhance conductivity. Kapton, which can withstand high heat, was modified by plasma cleaning to enhance its hydrophilicity, thereby allowing multi-layer printing to occur. In this way, manipulation of graphite-derived graphene was successfully carried out to print conductive patterns which will have applications in biomedical engineering, as well as other fields.

28. COLORIMETRIC SENSORS ARRAY FOR THE DETECTION OF WARFARE ANALYTES

Andres Mora, *Dr. Michael Kangas, and Dr. Andrea Holmes*
Department of Chemistry, Doane University

To prevent casualties in tactical areas, such as in warfare, it is imperative to know what hazardous substances are surrounding the soldier. The presence of chemical weapons, like nerve gases and toxins, may not be recognized by the soldier and could result in dangerous exposure. Colorimetric arrays could offer an attractive method in detecting warfare analytes because they result in a color change when they are exposed to analytes. The purpose of this research is to find the fastest and most affordable detection method by formulating sensors for printing on solid support, like paper, that can be then used by soldiers or emergency first responders in the field. The results of this research will show how colorimetric sensors were formulated and tested using 96-well plates, to compare the color change of sensors with compounds that mimic chemical weapons, explosives, and other agents. The colorimetric sensors that worked the best in solution are printed on paper using a Inkjet printer and exposed to the analytes. The arrays are scanned using a commercially available desktop scanner. The resulting images were analyzed using ImageJ and chemometric methods. Adhesion studies were also performed on all sensors to determine if these attach properly to the paper without leaching.

29. OPA-1 DEFICIENCY IN SKELETAL MUSCLE INCREASES MITOCHONDRIA-ER CONTACT FORMATION

***Margaret Mungai**, Yahang Li, B.S., Serif Bacevac, B.S., Leo "Jake" Kazma, Benjamin Kirk, Jessica Ponce, B.S., Pablo Campos Morales, Kathy Walters, B.S., HTML, Antentor Hinton, Jr., Ph.D., Renata Pereira Alambert, Ph.D., and E. Dale Abel, M.D., Ph.D.*
The University of Iowa

Defective mitochondria-associated membranes (MAMs) or mitochondria and endoplasmic reticulum (ER) contact sites (MERCs), has been associated with insulin Resistant Type 2 Diabetes Mellitus (T2D). MERCs are enriched with specific proteins and lipids that are believed to mediate inter-organellar communication such as calcium and lipid tra1nsfer, autophagosome formation, regulation of mitochondrial morphology, and apoptosis. We have previously demonstrated that OPA-1 deficiency in skeletal muscle induces ER stress, which correlated with upregulation of Mitofusin-2 (MFN-2), which is a known tethering protein in MERCs. Therefore, we hypothesized that OPA1-induced mitochondrial stress results in narrowing of MERC distance through the upregulation of tethering proteins. To test this hypothesis, we surveyed for several MERCs proteins in OPA1-deficient skeletal muscle samples and primary myoblasts. Primary myoblasts were generated by isolating satellite cells from OPA-1 floxed mice and subsequently deleting OPA1 by infecting the cells with adenoviral Cre recombinase. Ablation of OPA-1 in myoblasts increased the following MERC proteins: MFN-1, MFN-2, and GRP-78 (BIP). Similarly, loss of OPA-1 in skeletal muscle increased MFN-1 and MFN-2, in addition to other MERCs proteins, namely PACS-2, GRP75, BIP, and IP3R. Analysis of OPA-1 deficient cells by confocal imaging revealed an increase in MERCs, estimated by GRP78 or Cav-1 colocalization with MitoTracker after Z series reconstruction. TEM Analysis of OPA-1 deficient myoblasts and soleus skeletal muscle confirmed an increase in the number of MERCs and a reduced distance between ER and Mitochondria. Collectively, these data suggest that loss of OPA-1 in muscle cells results in the induction of MERC proteins, which correlates with increased MERCS formation. Increased MERCs may represent a compensatory mechanism in response to mitochondrial stress that is precipitated by OPA1 deficiency.

30. PATTERNS OF NUTRIENT UPTAKE IN NATIVE AND INVASIVE WETLAND VEGETATION ALONG AN EXPERIMENTAL NUTRIENT GRADIENT

***Chanelle Murtha** and Dr. Kenneth Elgersma*
University of Northern Iowa

Cattail species provide food, shelter, and nesting areas for a variety of animal species that are native to wetland habitats. Cattails also help stabilize the soil in wetlands. However, with the rise of "Cattail-choked" wetlands, it is necessary to discover the primary influence of invasiveness in this particular species. A common theory for invasiveness is the role of hybridization. This summer research project aimed to investigate the invasiveness of two different cattail species, the hybrid between these two species, and how these three respond to excess nitrogen pollution that runs off into wetlands. A plant's ability to absorb nitrogen is essential for the development of chlorophyll. Chlorophyll is the key source for food and energy during the photosynthesis process. Typha angustifolia, Typha latifolia, and the hybrid Typha x glauca were the highlight of this research focus. The research questions were as follows; do Typha species differ in nitrogen content, and how responsive are the Typha species to the nitrogen level in fertilizer? This was investigated by focusing on the different percentages of nitrogen content in each species during the experimental process, which was conducted over the course of about four years. The methods used in this project began in 2012-2016 with the execution of the experimental design and launching the cattle tanks at two sites in Michigan. Many cattle tanks were transformed into wetland environments. They were each given a specific nutrient regimen as well as a controlled amount of the three cattail species. The rate of growth was recorded and samples were harvested for further analysis. Leaf tissue samples were then collected, dried, weighed, and stored in summer 2016. In 2018, I processed and analyzed the leaf tissue nitrogen content of these archived samples. Next, the grinding process of species types Carex spp., Juncus balticus, Schoenoplectus acutus, Typha angustifolia, Typha X glauca, and Typha latifolia was implemented and executed by me. Finally, the samples were analyzed for nitrogen content in a Thermo Scientific Flash 2000 Elemental Analyzer. Due to hybridization, it was expected that species Typha x glauca would contain the most nitrogen content percentage. This hypothesis was based on the theory of invasiveness in plants. During this summer research project, it was later found that species Typha angustifolia, Typha latifolia, and Typha x glauca all resulted with levels of nitrogen content. Although there was not a large distinction, the Typha species did however have some disparities. Typha latifolia (broadleaf) had the overall highest percentage, with about 2.7% nitrogen. Typha x glauca (hybrid) had 2.5% nitrogen and Typha angustifolia (narrow leaf) had 2.3% nitrogen. In future direction of this research, it would be interesting for the ecological consequences that this data provides to be investigated further. Highlighting the ecological issue of higher obivery in the wetland environment. This sparks the question, how would this affect the ecosystems? Unfortunately, if the cattail species continues to grow at this rate, a variety of other wetland plants will not have the opportunity to thrive natively. Animals and other organisms that call wetlands home, will eventually lose their habitat, as well as ingest more pollution once the rate of herbivory continues to rise. With the decline of native plant life, flooding could also become a major problem in wetlands and surrounding areas. Overall, these invasive plants require further study. The role hybridization plays in the rate of growth for invasive plants like the cattail species, requires additional investigation as well. Therefore, based on our results, we cannot confirm that due to hybridization Typha x glauca is the primary invader that contains the most nitrogen. Our findings indicate that the broadleaf, Typha latifolia continues to gather more nitrogen content due to its size.

31. QUANTITATIVE GROWTH OF CANDIDA ALBICANS USING 3M PETRIFILM ANALYZING BLUE COLOR INTENSITY

***Najee Mustafaa**, Andrea Holmes, Arin Sutlief, Michael Kangas*
Department of Chemistry, Doane University

3M™ Petrifilms™ have been developed as automated enumeration procedure of colony forming units (CFUs) of yeasts and molds. The petrifilms are a sample ready culture medium system, they contain nutrients supplemented with antibiotics, a cold water soluble gelling agent and an indicator system that facilitates biofilm enumeration. The indicator system is made of a molecule Nitro blue Tetrazolium

(NBT), used in a variety of applications including Northern, Southern, and Western blotting, that has a blue color change in the presence of alkaline phosphatase in the cell wall of the yeast, mold, or bacteria. Biofilms are an association of microorganisms in which microbial cells adhere to each other on a living or non-living surfaces within a self-produced matrix of extracellular polymeric substance. Biofilm persistence is believed to originate from unique physical characteristics (shape, size, stiffness, etc) adapted during biofilm formation. Candida albican, being a type of yeast 3M petrifilms can detect, is an opportunistic pathogenic yeast that is a common member of the human gut flora, and when overgrown, it can lead to candidiasis (yeast infection). The detection of Candida albicans is sought out, because of it is known cause health issue in people and medical devices. In this study, biofilm formation of Candida albican on Petrifilms was monitored and quantified by RGB values extrapolated from images using ImageJ As the biofilm developed, the blue values increased. Values increased, displaying a positive trend, when the area of blue developed more on the 3M petrifilm.

32. CHARACTERIZATION TECHNOLOGIES OF SPACE GRADE POLYMERS

José Prado *and Dr. J. Eliseo De León*
Iowa State University

Every few years, Earth and Mars reach perigee, about 55 million kilometers. Depending on trajectory and velocity, therefore fuel consumption, it takes as much as 300 days to traverse the distance [1]. The cost of lifting payloads from the earth's surface, for satellite/geosynchronous deployment, use during space flight, extravehicular activity missions, and long-range space missions hovers between $USD 14,000/kg and $USD 40,000/kg [2]. This expense puts a great strain in the industry to reduce the overall costs as much as possible, as to make the benefits of space missions outweigh the costs of the said mission. One approach is to mitigate the cost of placing components in space by using lower density materials that match the thermo-mechanical properties of traditional component constituents [6]. This investigation explores the feasibility of using alternative, low-density, thermoplastic, engineering polymer materials: polyamide-imide (PAI), polyetherimide (PEI), polyphenylene sulfide (PPS), and polyether ether ketone (PEEK), in lieu of traditional, higher density materials for projected Mars missions. The selection of polymer materials suitable for an extraterrestrial mission is firmly rooted in robust, high temperature, high specific-stiffness and -strength materials [6-19]. The use of low density, high strength, robust polymers offers an alternative to higher density metallic and ceramic materials traditionally used for mission components [18, 20], Table 1. The investigation of thermal stability, percent (%) crystallinity, and mechanical hardness properties of four high-temperature engineering polymer: polyamide-imide (PAI), polyetherimide (PEI), polyphenylene sulfide (PPS), and polyether ether ketone (PEEK), is carried out to demonstrate that these polymers may be suitable LEO and extraterrestrial space mission applications.

33. DEVELOPMENT OF FINGERPRINTS ON PAPER AT UIU

Madelaine Quistgaard *and Dr. Butikofer*
Upper Iowa University

Upper Iowa University has an introductory forensic science laboratory course that involves processing a crime scene including analysis of evidence collected. In the crime scene scenario there is a note on paper with latent fingerprints. In the three times this scenario has been performed development of these fingerprints with ninhydrin spray has been inconsistent. A standardized method for laying down fingerprints was tested and used on paper to explore three different development methodologies. The methodologies were magnetic powder, different ninhydrin solutions, and silver nitrate physical developer. The results were analyzed using a ranking system developed from standardized method of laying down fingerprints. The results indicated that the magnetic powder gave good results for developing fingerprints instantly, but prevented further analysis of the evidence. The ninhydrin solutions gave inconsistent results due to the many variables associated with the development process such as temperature and humidity. The silver nitrate physical developer produced few results. The method that would be good for the Upper Iowa University's laboratory course would be magnetic powder because it produced the best results. Studies are underway to examine how temperature and humidity affect color development using the ninhydrin solutions.

34. A SCREEN OF CHROMATIN ARCHITECTURAL PROTEINS WITH AND WITHOUT HISTONE MODIFICATION PARTNERS FOR INSULATOR ACTIVITY IN SACCHAROMYCES CEREVISIAE

Nicholas Scalora*, Joe Larkin*, Keegan Whisler*, and Brett Schofield*
Department of Biology, Doane University

One mechanism cells utilize to regulate gene expression is modifying the degree of DNA compaction. Genes found in regions of tightly compacted heterochromatin tend to be silenced, while genes in loosely compacted euchromatin tend to be readily expressed. The repressive histone markers that cause sequences to condense into heterochromatin have a propensity to spread down chromatin fibers. The boundary between these regions is determined by binding sites for insulator proteins. Although a number of these proteins have been identified in various systems, the only mammalian protein thus far shown to have insulator activity is CTCF. CTCF and other chromatin architectural proteins cause wide-ranging reorganization of DNA partially through the recruitment of various histone modification and reorganization complexes. The current work seeks to screen mammalian chromatin architectural proteins alone or in combination with a mammalian partner protein for insulator activity in Saccharomyces cerevisiae. The insulator assay tests whether specific recruitment of the candidate protein can activate a gene located in a sub-telomeric region, which is normally silenced by the telomere position effect. A protein with insulator properties will shelter this gene from heterochromatin, while a non-insulator protein will have no effect on the gene's expression. Current human candidate proteins include Satb1, Satb2, and MeCP2. These proteins are expressed either individually or with an HDAC1 partner protein. Other candidates and partners will be tested at a future date. The yeast insulator protein Reb1 was used as a positive

control. * These authors contributed equally to the presented work.

35. IS THE NLS CONTRIBUTED BY CAMTA1 SUFFICIENT TO PROMOTE TAZ DRIVEN TRANSFORMATION OF CELLS?

***Shadi Shariff**, Keith Garcia, Nicole Merritt, Dushyandi Rajendran, Zhen-Yuan Lin, Xiaomeng Zhang, Hatrina Mitchell, Colen Fullenkamy, Ann Claude Gingras, Kieran Harvey, and Munir Tanas*
Kirkwood Community College

Cancer is difficult to treat after invasion and metastasis because of its spread to distance part of the body. Invasion and metastasis are related to the cells ability to migrate in the extracellular matrix (ECM) composed of aligned collagen and other ECM components including hyaluronan. Matrix metalloproteinases (MMP) are enzymes produced by both cancer and stromal cells like stellate cells to degrade and remodel the ECM. Cancer cells show higher MMP activities, making them attractive targets for design of therapeutic inhibitors. MMP activity is controlled by numerous factors in the tumor microenvironment (TME). While MMP expression is frequently assayed, the enzyme activity is the biologically relevant function and is rarely quantified. When it is, it is quantified on 2D substrates that lack features of the 3D ECM in the TME. We compared MMP activity in 2D and 3D ECM environments containing important components found in the pancreatic TME. We measured MMP activity using a substrate that fluoresces when cleaved by MMP. This fluorescence can be detected allowing us to measure MMP activity. We have developed an approach of collapsing collagen gels with embedded cells to measure MMP activity in 3D constructs. We are assessing the role of three important components in the ECM in regulating MMP activity: stellate cells, hyaluronan, and ECM alignment. We compared 2D vs. 3D ECM environments in their ability to activate MMPs. MMP activity is higher in 3D as compared to 2D. This assay gives us the ability to measure MMP activity in 3D environment.

36. ESTROGEN POSITIVELY AFFECTS SPATIAL DISCRIMINATION IN FEMALE OVARIECTOMIZED RATS

***Raissa Souza**[1,2], Sejal Chudasama, Justin Garrel, Henry Blair, and Jana Veliskova[2]*
[1]Biology Department, Nebraska Wesleyan University
[2]Dept of Cell Biology, New York Medical College

The dentate gyrus is a part of the hippocampus involved in pattern separation processing. In the hippocampus, there are dendritic spines, which are sites of synaptic plasticity that increase the surface area of neurotransmission and allow the brain to collect new information. Learning and memory are related to a type of synaptic plasticity called long term potentiation (LTP) which means a stronger communication of neurons means better learning. Estrogen modulates hippocampal function. Estradiol plays a role in the dentate gyrus learning process by: regulating spine density, modulating acetylcholine expression, modulating gating function of the DG by selective filtering the frequencies, regulating the NMDA-mediated responses, and vitro slices data show that E2 affects expression in the dentate gyrus suggesting differences in the dentate gyrus function. It is hypothesized that the pattern separation detection depends on the hormonal status. Adult ovariectomized females were used on the experiment. Four to six days after the surgery, animals were assigned to their groups and either injected with 2mg/0.1ml/day of E2 or 0.1ml of oil for 4 days. The animals underwent behavioral spatial environmental and metric testing 24 hours after the last injection. It was hypothesized oil-injected animals would have deficit on separation detection tasks compared to estrogen treated animals. However, this study rejects the hypothesis as estrogen treated animals showed deficits in exploration of the new environment as well as the new position of the objects. This suggests the new information in these tasks may come in frequencies, which are filtered by the dentate gyrus. Future directions include testing animals at the water maze and have animals to be trained and receive an estrogen replacement therapy for a longer period of time.

37. GENOME SEQUENCES OF THREE CLUSTER C MYCOBACTERIOPHAGES, BIPOLARISK, BREAD, AND FUDGETART

*Brandon W. Gannon, Kathryn J. Grint, William MG. Herron, Jason T. Iltz, Teryn M. Koch, Kaitlyn S. Mahnke, Brea D. Murnan, Alexandria M. Osborn, Danielle M. Schreiber, **Grace L. Su**, Jaime G. Troester, Dr. Dane M. Bowder, and Dr. Erin L. Doyle*
Doane University

Three lytic cluster C mycobacteriophages, Bread, Bipolarisk and FudgeTart were isolated from enriched soil samples found in Crete, NE, USA. All three phages are classified as subcluster C1 and infect Mycobacterium smegmatis mc2155. Each is a myovirus, a trait unique to cluster C phages. The phage genomes were sequenced at the Pittsburgh Bacteriophage Institute using Illumina MiSeq Newbler technology. Gene start sites were predicted using Glimmer and Genemark, then manually checked using DNA Master. tRNA's were identified using ARAGORN and tRNAscan-SE and predicted gene functions were assigned using several different databases. The genome lengths of the three phages range from 153,796 bp to 154,734 bp, with GC content ranging from 64.7% to 64.8%, similar to the mycobacterium host M. smegmatis, 67.4%. All three phages have a similar number of genes with predicted functions, 61 for Bipolarisk and FudgeTart and 60 for Bread, as well as a similar number of tRNAs, 35 for Bipolarisk, and 31 for Bread and FudgeTart. Each phage genome contains one tmRNA. Bipolarisk, Bread and FudgeTart's genomes are circularly permuted and canonically arranged, with the majority of binding and attachment genes co-located near the 5' end of the annotated sequence, structural and viral assembly genes in the middle, and lysis cassette genes near the 3' end. Despite structural similarities, there are a few notable differences in specific genes between the three genomes, such as FudgeTart_104, which differs from Bipolarisk_103 and Bread_105 and FudgeTart_160, which does not occur in the other two phages.

38. SURVEY OF BAYESIAN NETWORKS AS A PROBABILISTIC GRAPHICAL MODEL

***Eleni Vaskova**[1] and Dr. Jin Tian[2]*
[1]Department of Computer Engineering Iowa State University
[2]Department of Computer Science Iowa State University

Representing knowledge and uncertainty with high-dimensional data is a challenge regarding inference and learning. Numerous computational processes produce large-scale, random variables that are connected to form complex relationships. Probabilistic Graphical Models, using graph theory, manipulate the structure to represent these complex

relationships. To make this representation more efficient, a Bayesian Network is a Probabilistic Graphical Model used to produce a more compact solution to address the inference and learning problem. This survey is focused on Bayesian Network structures that use constraint-based and score-based learning algorithms to model the complexity of this data. The algorithms produced find relationships between genes and the environment, computation for image processing, meteorology for gathering climate variability data, and profitability forecasting in economics. After reviewing the literature, much debate has been noted on which algorithm structure represents a more elegant solution. In certain comparative forensic and meteorological study trials, various search algorithms (i.e. TABU, GSMAG, Random restarts techniques) that find where propagated values are implemented were used. It seems as if score-based algorithms are said to learn Bayesian Networks with greater speed and accuracy. However, because of various factors involved including computation, dependencies on graph types (i.e. I-Map, MAG), variability of techniques, it is understood that further exploration of how to produce these algorithms is a viable research path.

39. EPIGENETIC EFFECTS OF ENVIRONMENTAL CONTAMINANTS ON TURTLES WITH TEMPERATURE-DEPENDENT SEX DETERMINATION

***Victoria Villanueva**, Daniela Flores, and Fredric Janzen*
Iowa State University

Turtles play vital ecological roles as mineral cyclers and indicators of health concerns like water contamination. However, they are among the most threatened vertebrate groups. Some turtle species exhibit temperature-dependent sex determination (TSD) where the temperature during embryonic development determines sex. Moreover, many man-made chemicals and their breakdown of products in soil and water can act as endocrine disrupting compounds (EDC), chemicals that can interfere with the endocrine system, further skewing sex ratios. DNA methylation, an epigenetic mark suspected to play a role in TSD, can serve as a biomarker of EDC impact. We investigated the interactive effects of temperature and EDC on epigenetic signatures involved in sex determination. Changing environmental conditions were simulated by applying chemicals (estradiol, control, fadrozole) to painted turtle eggs incubated at three temperatures (female-producing, control, male-producing) in a full factorial experimental design. Although all nine treatments produced both sexes, we found male-biased sex ratios for all treatments, with the exception of offspring from the fadrozole-treated and control eggs incubated at female-producing temperature. Blood and gonadal tissues were obtained from a subsample of these offspring five years after hatching to test the hypothesis that temperature and EDC persistently influence DNA methylation levels and the TSD molecular mechanism. Although female turtles overall had less DNA methylation in their gonadal tissue than males, sex interacted significantly with chemical treatment to influence DNA methylation levels. These results characterize the complex interactive effects of human-mediated environmental changes at both the phenotypic and molecular levels in species with TSD.

40. COMPARING ROOT TRAITS AMONG DROUGHT ADAPTED WINTER ANNUAL CLARKIA SPECIES

***Sean Wright** and Vince Eckhart,*
Grinnell College, NSF

Understanding plant adaptation to stressful conditions is critical to determining the distribution patterns and abundance of wild plant species and to learn how to sustain agriculture in a changing climate. For species native to dry areas, plant resource allocation and anatomy can be crucial to survival. Root traits' potential contributions to adaptation to water scarcity tend to receive less attention than the contributions of shoot traits. In this study, I compared root traits likely to affect drought adaptation in four species in the genus Clarkia, winter annual plants that vary in their hydrologic niche: the range of water availability a species can tolerate. I hypothesized that biomass allocation to roots, young seedling root depth, and mycorrhizal colonization rates would be highest in species most tolerant of low water availability. Support for this hypothesis was mixed. The two species with the highest root allocation included one drought-tolerant species, Clarkia xantiana, and another species (C. unguiculata) that occupies areas with greater water availability. Surprisingly, C. unguiculata also exhibited the deepest seedling roots of any species. Clarkia speciosa, apparently the most drought-tolerant species of the four, had distinctly high colonization by mycorrhizal fungi, as would be expected. These findings suggest that other sets of traits (e.g., tissue hydraulic properties) may underlie species differences in distribution and adaptation. Future studies may investigate in the structure and function of water-conducting tissue (xylem).

OPPORTUNITIES FAIR EXHIBITORS

Ames Laboratory
Ames Laboratory, a U.S. Department of Energy science laboratory, provides summer, fall and spring paid internships for undergraduate and community college students from across the country. Through these internships, students work with scientists and engineers in real-world research laboratories and technical areas on projects of mutual interest. Students prepare a research report, abstract, and poster as part of the fulfillment of the 10 week (summer) and 16-week (fall and spring) internship programs. Students are paid $500 per week, provided housing in Iowa State University housing, and receive some travel expense.

Emerson Fisher Values
Nothing comes close to the career opportunities we provide at the Fisher business of Emerson. Whether you are a recent grad looking for a full-time opportunity or a current student looking for an experiential education opportunity, the Fisher business of Emerson offers challenging and rewarding work that will utilize and grow your knowledge, skills, and experience base. The Fisher business of Emerson is the largest control valve manufacturer in the world. Being part of a division that is the world leader in process controls systems and solutions shows our proven past and our promising future. As a global company, the Fisher business of Emerson is committed to continue to lead the industry with time-tested and innovative solutions. If you want to work in an environment where people, teamwork, and quality truly make a difference, Fisher is the place for you!

IINSPIRE-LSAMP Alumni Committee
The IINSPIRE-LSAMP Alumni Committee aims to unite post-baccalaureate IINSPIRE students in hopes to facilitate a successful undergraduate career for current students. To do this, the Alumni Committee will attend conferences, workshops, and virtual discussions utilizing our network of IINSPIRE alumni.

Iowa State University College of Veterinary Medicine
As the nation's first public veterinary school, Iowa State University's College of Veterinary Medicine takes pride in its heritage while shaping the future of veterinary professional practice, education, research and service.

Iowa State Ronald E. McNair Postbaccalaureate Achievement Program
The Ronald E. McNair Postbaccalaureate Achievement Program prepares qualified undergraduates for entry to graduate school, with the primary goal of increasing the attainment of Ph.D. degrees by students from underrepresented segments of society. The McNair Program prepares graduate school bound undergraduates through three areas: research, graduate school preparation, and personal experiences.

Nahant Marsh
Nahant Marsh is a 256-acre treasure nestled in Southwest Davenport. It is part of the 513-acre wetland complex that is bordered by the Mississippi River, Interstate 280, and Highway 22. Nahant Marsh preserve is one of the largest urban wetlands on the Upper Mississippi River. Research is an integral part of Nahant Marsh. Research projects also allow students to participate in exciting projects and gain hands-on experience in their field of study. We offer research opportunities in the fields of Wildlife Biology, Ecology, Animal Behavior, Botany, Hydrology, Chemistry, Genetics, Geology, Geography, Toxicology, and many more.

Research Innovation in Science Enrichment University Program (RISE^{UP})
RISEUP is a summer research and experiential learning program at Iowa State University availability to underrepresented community college students. Student participate in professional development activities that prepare them for transfer to baccalaureate degree programs in STEM while working alongside faculty in research.

Undergraduate Research Program at Iowa State University
Undergraduate Research program at ISU supports all students in their involvement in research on campus, nationally and internationally.

University of Iowa Summer Health Professions Education Program (SHPEP)
The Summer Health Professions Education Program (SHPEP) at The University of Iowa is a FREE six-week summer enrichment program focused on improving access to information and resources for college students who are underrepresented in the health professions. More information is available at https://medicine.uiowa.edu/shpep/overview.

University of Iowa Graduate Programs in the Department of Physics and Astronomy
Programs of Research include: Astronomy and Astrophysics, Condensed Matter and Materials Physics, Theoretical Nuclear Physics, Theoretical Particle Physics, Plasma Physics, and Space Physics.

University of Iowa PREP
The University of Iowa received a NIGMS funded grant for a post baccalaureate research education program. PREP@ Iowa will provide recent graduates from groups traditionally underrepresented in biomedical fields with a highly supportive and customized program of career development activities, seminars, coursework, GRE preparation and laboratory research experiences. This program is designed to enhance the participants' qualifications and competitiveness for graduate school.

University of Northern Iowa Research Programs
Learn about the Summer Undergraduate Research Program (SURP), Iowa Space Grant Consortium Research Fellowships, High School Research & Engineering Apprentice Program (REAP) and Summer STEM camps at the University of Northern Iowa.

University of Northern Iowa College of Humanities, Arts and Science

A SPECIAL THANK YOU

Annual Conference Planning Committee

Kata McCarville
Upper Iowa University

Lori Adams
University of Iowa

Mary Darrow
Iowa State University

Danielle Mitchell
Iowa State University

Diane Rover
Iowa State University

Vincent Rodgers
University of Iowa

Jim Swartz
Grinnell College

Annual Conference Program Committee

Rebecca Schmidt
Upper Iowa University

Jose Boquin
Augustana College

LeAnn Faidley
Wartburg College

Paul Faronbi
Nestle Purina

Carmen Jones
Iowa State University

J.Y. Cindy Kim
University of Iowa

Douglas Mupasiri
University of Northern Iowa

Brian Ritter
Eastern Iowa Community College District

Queenster Nartey
John Hopkins School of Medicine

Cailin Orr
SERC at Carleton College

U. Sunday Tim
Iowa State University

Program Assistants & Volunteers

Michael Bechtel
Wartburg College

Alfredo Colina
Iowa State University

Caleb Cook
Iowa State University

Jay Garaycochea
Wartburg College

Yingying Huang
Iowa State University

Myra James
Iowa State University, '18

Loui Landa
Iowa State University

Han Le
Nebraska Wesleyan University

Juanita Limas
University of North Carolina-Chapell Hill

Angela McKinney
Nebraska Wesleyan University

Juan Rejino
Nebraska Wesleyan University

Paul Skrada
Upper Iowa University

Yash Solanki
Iowa State University

Ahilan Tamilselvan
Iowa State University

Aisha Washington
Iowa State University

Svitlana Zbarska
Iowa State University

Videography & Photography

B & G Productions
Videography
Ames, Iowa

Amy Vinchattle
Photography
Ames, Iowa

Venue & Hotel

Kristen Koening
Sales Manager
Scheman Building at Iowa State Center

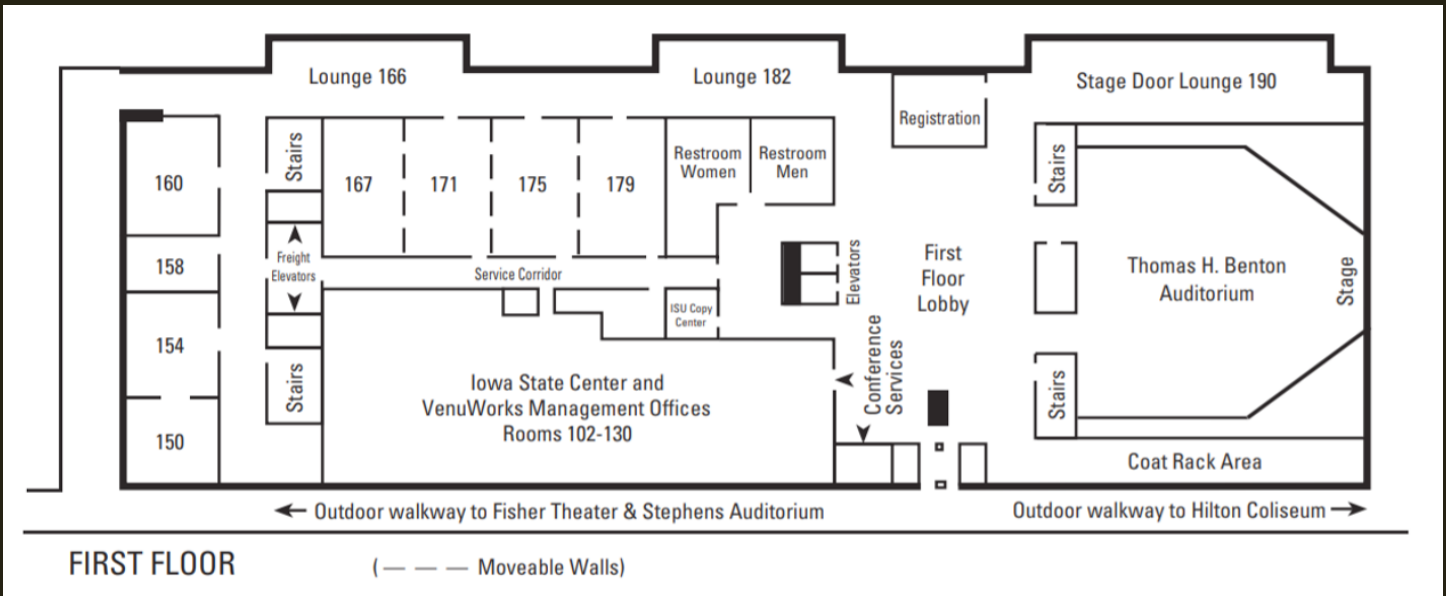
Taylor Schwartz
Sales Manager
Radisson Inn Ames Conference Center

Sponsors

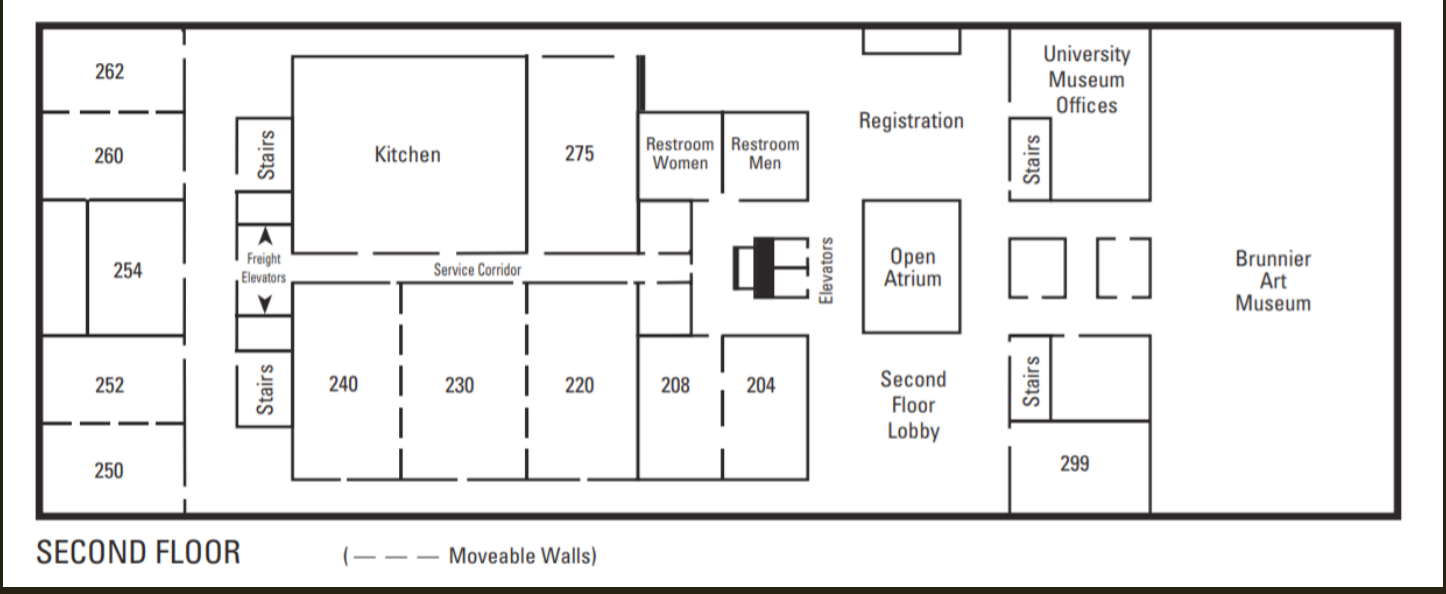
LI-COR

NSF

VENUE MAP



FIRST FLOOR (— — — Moveable Walls)



SECOND FLOOR (— — — Moveable Walls)