FOURTEENTH ANNUAL

COFI STUDENT RESEARCH CONFERENCE

April 27, 2019

2019 CONDENSED SCHEDULE

10:00-11:00a.m. **Registration for presenters, moderators, and committee members; poster set up**
Langroise Foyer

11:30 p.m. **Opening Remarks: Co-Presidents Brigham and Everett**
Langroise Auditorium

11:50 p.m**.** **Fast Pitch**
Langroise Auditorium

12:10 **Theatre Senior Showcase Preview**
Langroise Auditorium

12:30 **Film Screening**
Langriose Auditorium

1:00 p.m. *20 minute break*

1:20 p.m**.** **Oral Papers: (also see schedule inside back cover)**

Session 1	**Session 2**
Bn103	Bn101

2:20 p.m. *15 minute break*

2:35 p.m**.**

Session 3	**Session 4**
Bn103	Bn101

3:50 p.m**.** *10 minute break*

4:00-5:00 p.m. **Senior Art Exhibition and Panel** Rosenthal Gallery

5:00-6:00 p.m**.** **Poster/Display Session** Langroise Foyer

5:00-6:00 p.m. **Reception** Langroise Foyer

6:00 p.m**.** **Raffle/Awards Ceremony** Langroise Foyer

7:00 p.m. **Theatre Senior Showcase** Langroise Studio Theatre

Conference Planning Committee

Jen Wallin-Ruschman, Chair

Carolyn Dadabay, Jennie Daniels, Blake Densley,
Katie Devine, Andrew Gades, Anna Himler, Courtney Kelly,
Thomas Price, Sarah Schoultz, Caleb Tormey, Alice Vinson, Erin Walker,
Laurel Weiss, Lilly Whitehead, Micah Woodard

With Special Thanks to…

Presidents Jim Everett and Doug Brigham

The Associated Students of The College of Idaho
(student government association)

Private Donors to The College of Idaho

Ashley Smith
(cover photo)

Carolyn Gonzalez, Anna Himler, Cara Laney, Caleb Tormey
(moderators)

Special Events & Conference Services

Adam Garvey, Audiovisuals

John Britschgi, Web Page Guru

Carolyn Gonzalez, Anna Himler, Dali Islam, Cara Laney,
Alice Vinson, Jen Wallin-Ruschman
(SRG Grant Committee)

AND
All the Great Folks at Maintenance and Operations

FOURTEENTH ANNUAL
C OF I STUDENT RESEARCH
C O N F E R E N C E
April 27, 2019

Greetings from the Conference Chair:

We are delighted to welcome you to the 14th Annual College of Idaho Student Research Conference. Students from a range of disciplines will share their scholarly and creative accomplishments with the entire C of I community. In addition to research talks and posters, we are excited to showcase a theatre performance, the senior art show, and a student produced documentary film.

The conference promises to spark your intellectual curiosity and provides opportunities for meaningful dialogue across the C of I campus community. We are so thrilled about the range and quality of all the student presentations this year.

In its 14th year, the Student Research Conference has grown into one of the largest student-attended events on campus. The conference program includes the return of fast pitch presentations, 18 oral presentations, 27 posters, and a re-conceptualized and more interactive Senior Art Exhibition. In total, the conference will feature 58 different student authors, with submissions from Psychology, Biology, Spanish, Chemistry, Physics, Political Economy, Human Health and Performance, Environmental Studies, and Music.

The Student Research Conference is possible because of the support of the administration, staff, faculty and particularly the SRC planning committee. However, the conference would not happen without the dedication and passion of the presenting students. We find their creativity, curiosity, and perseverance inspiring and think you will as well. Many of these presentations are the culmination of a year or more of work. We are pleased to highlight the vast range of student research and creativity happening at the College of Idaho. We hope that you find today enriching and that you will take the time to engage with these scholars and artists.

Thank you for joining us today to recognize and celebrate the value of research, scholarship, and creative work in our liberal arts tradition at the annual College of Idaho Student Research Conference.

On behalf of the Student Research Conference planning committee,

Jen Wallin-Ruschman, Ph.D.
Assistant Professor of Psychology
Director of Student Research and Creativity

GENERAL INFORMATION

Registration:
Registration for student authors will be held in the **Langroise Foyer** from 10:00 am until 11:00 am. Presenters will receive a copy of the program. Each student author will also receive a name badge which should be worn for the entire conference. Posters should be set up during this time. Students giving oral presentations should at this time also download their presentation in advance onto the computer in the room in which they will present.

Registration Times:

Saturday 10:00 a.m. until 11:00 a.m.

Programs:
Programs will be available in Langroise and Boone. The program contains the text of each abstract, order of presentation times, and an alphabetical index by student name on the last page.

Conference Protocol:

All papers presented at the C of I SRC are authored by students. For some of you, this may be your first conference. Welcome aboard! To fully appreciate the experience, here are some of the guidelines you might find useful:

- We will maintain the program schedule. If presenters are absent, the session will not move other presenters forward in the timetable. Thus, you are assured that you get to hear what you are expecting to hear.
- Enter and exit sessions in progress quietly and inconspicuously.
- When you are in an area where a session is not occurring, other sessions may be going on nearby. Please keep the noise down, even in hallways.
- Always respect others' opinions. Questions can be a challenge, but should not confront or demean. Constructive criticism is important, but so are courtesy and good manners.

What the badge colors mean:
All student presenters will be wearing a conference badge with a blue circle. Red circles on the badge indicate that the person is a moderator of a paper session. The Conference Committee members wear badges with green circles. If you have a question or problem, please ask one of the committee members.

Food and Beverage:
Snacks and beverages will be available in the lobby of Boone Hall during the oral presentation sessions and at Blatchley Parlor during the Senior Art Exhibition. A reception with hors d'oeuvres will begin at 5:00 pm in the Langroise Foyer.

11:30 a.m. **Opening Ceremony**

Jen Wallin-Ruschman, Moderator

Langroise Auditorium

Opening Remarks

Jim Everett and Doug Brigham

Co-Presidents of The College of Idaho

11:50 a.m. **Fast Pitch Session**

Langroise Auditorium

Presenters:

Laurel Weiss

Emma Powley

Aurora Cossairt

Amber Tavener

Virginia Harness

12:10 p.m. **Theatre Senior Showcase Preview:**

Unwrap Your Candy
Langroise Auditorium

Preview the Theatre Senior Showcase, then join us for the full show at 7:00 pm tonight in the Langroise Studio Theatre! No cost for admission. Seniors include Tristan Beauchaine, David Garrison, Madison Hartwell, Alexander Sproule-Fendel, and Jeanna Vickery

12:30 p.m. **Film Screening:**

After Crossing the Mountain Border: The Dara'ang Migrants of Northern Thailand
Kennedy Alvaro and Hannah DalSoglio
Langroise Auditorium

The Dara'ang, also known as the Palaung, are an upland minority group from the Shan State of Myanmar. Known as peaceful tea growers and devout Buddhists, the Dara'ang have been repeatedly coerced, victimized, and blackmailed into becoming the foot soldiers for more powerful groups engaged in war, extortion, and drug trafficking. Seeking to escape this predicament, large communities of Dara'ang began migrating from Myanmar into Thailand in the 1990s. For over three decades, refugee Dara'ang families have worked to improve their standard of living. Drawing upon their own resourcefulness, industry, and outside support, these migrant communities are beginning to thrive in their new home. This documentary tells the story of Ta Lawan and the Dara'ang people as they cross the mountain border seeking refuge in Northern Thailand. *Faculty Sponsor: Alice Vinson*

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Oral Paper Session #1
Boone 103
Caleb Tormey, Moderator

1:20 p.m.

The Effects of Digital Versus Print Platforms on Learning

Hannah Shand and Kealah Baker

The current study compared college students' reading comprehension and perceptions across print and digital platforms. Undergraduate students were randomly assigned to review an academic article via print, computer or tablet, and then completed a 10-question comprehension quiz and a survey regarding perceptions of satisfaction, perceived control, effort, difficulty, familiarity with the device, and other similar questions. We found that comprehension was equivalent across all platforms and that participants spent an equal amount of time with each learning platform. Students' reports of satisfaction and cognitive load were also equivalent across learning platforms. Additionally, unlike previous research, familiarity with a digital platform did not affect students' performance. We also found that, within their education more generally, participants often preferred print over digital materials for learning. However, in the future, we might consider how the growing number of digital natives within the student population affects these results. Considering these findings, educators might offer both print and digital options to students, out of convenience and to appeal to students' preferences. Furthermore, these findings can reassure students that any of these platforms can help them learn new material. *Faculty sponsor: Kara Sage*

1:35 p.m**.**

Fire Flipping Floodplains: Estimating Sediment Delivery from Wildfire Blowdowns and Valleybottom Tree-throw

Tyler Truska

As important vegetation-altering hillslope disturbances in forested mountain region, wildfires instigate a cascade of hydrologic and geomorphic processes that enhance sediment and wood delivery to aquatic ecosystems and shape river environments. The 2016 Pioneer

Fire burned nearly 670 km2 within the central Idaho Batholith, and resulted in valley bottom patches of blowdown within Clear Creek. In this initial phase of a multi-year monitoring project our study asks: What is the role of fire-related blowdowns in mobilizing sediment from floodplains to stream channels? We use repeat photogrammetry to estimate sediment volumes mobilized from floodplain tree throw from a random sample of five rootwads (sediment and organic material at the base of a fallen tree) per reach. Three-dimensional models are constructed using the Agisoft Structure from Motion (SfM) software and CloudCompare to determine volumes of sediment. Repeat photos, collected annually, allow us to estimate the volume of tree-thrown sediment supplied to Clear Creek, and compare fire-related tree-thrown sediment yields from valley bottoms to other hillslope processes. Quantifying the relative contribution of sediment from different sources and monitoring the temporal and spatial variation of delivery and storage processes can assist post-fire land management response and further our knowledge of post-fire geomorphic change.
Faculty sponsor: Jaime Goode

1:50 p.m.

Examining Phase II Detoxification Activity in Signal Crayfish (*Pacifastacus leniusculus*) Antennal Gland

Courtney Kelly

Metal pollution has been a long-standing concern with adverse effects often observed in exposed wildlife populations. Bioindicators are commonly used as part of monitoring efforts to determine whether organisms exhibit biological responses to metals present in their environments. Previous studies have demonstrated that endogenous antioxidant biomarkers can be detected and modulated in the crayfish hepatopancreas, gill, and tail muscle tissue. However, no work has been done to detect these biomarkers within signal crayfish antennal gland. Antennal glands, hepatopancreas, and gill tissues were collected from untreated crayfish and crayfish treated with varying concentrations of zinc and copper chloride. Glutathione S-transferase colorimetric assays were run to detect and compare expression among the tissues. Species and tissue specific patterns are reported for these markers emphasizing

the importance of understanding and characterizing the regulation of these endogenous antioxidants when using them to screen populations for evidence of contaminant exposure. This research is supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Grant #P20GM103408. *Faculty sponsor: Mark Gunderson*

2:05 p.m.

The Dara'ang and the Art of Becoming Governed

Gavin McCaw, Kaytlyn Marcotte, Marine Vieille, Hannah DalSoglio, Kennedy Alvaro

Southeast Asia is marked by its diversity and, unfortunately, widespread ethnic conflict and political instability. This unsafe environment has led members of vulnerable ethnic groups, particularly those who reside in mountainous upland regions, to engage in refugee movements throughout the region. Yale political scientist James C. Scott discusses this particular subset of upland migrants in his book, The Art of Not Being Governed. He characterizes the interactions between the upland and lowland peoples as one where the former seeks to escape state control and official legibility from the latter. The Dara'ang are one such upland group seeking relocation. Since the 1990s, thousands of Dara'ang have fled Myanmar into Northern Thailand in a seemingly Scottsian pattern. This paper argues, however, that the Dara'ang exhibit shifting attitudes toward state control and legibility,Äîfrom one of escaping the state to one of embracing the state in search of an improved quality of life. Data for this paper was collected through archival research and fieldwork in Thailand and Myanmar in 2018. Inclusive of qualitative interviews and observational data, the paper analyzes collected evidence against Scott's theoretical framework to modify Scott's conclusions, at least with respect to the experience of Dara'ang refugees. *Faculty sponsor: Robert Dayley*

Oral Paper Session #2

Boone 101

Carolyn Gonzalez, Moderator

(Some talks in this session will be presented in Spanish)

1:20 p.m.

Órganos artificiales: El futuro de los trasplantes en España

Nicole Jordan

En España la utilización de órganos donados para el uso en trasplantes se ha debatido tanto legal como éticamente. España es el líder global en la tasa de órganos donados. Sin embargo, las actitudes negativas del público y de profesionales médicos, y el debate que rodea la clasificación de la muerte del donante sirven como una barrera ética a la utilización adecuada de los órganos obtenidos. Además, existe una preocupación por la seguridad de los trasplantes. Si los órganos son funcionales después de la cosecha, existe el riesgo de rechazo en el receptor, infección, y efectos tóxicos del uso de inmunosupresores. Aun así, el éxito de órganos trasplantados disminuye gravemente después de cinco años. Una solución para España que la llevará a evitar estos problemas éticos y científicos es invertir en la investigación y en la utilización de órganos artificiales para los trasplantes. A pesar de una tasa menor de donación en los Estados Unidos, este país tiene una tasa mayor de trasplantes a causa, en parte, de la utilización de órganos artificiales. Si España mejora el desarrollo y el uso de órganos artificiales, posiblemente pueda aumentar la tasa de trasplante, no solo la de donación y salvar más vidas. *Faculty sponsor: Carolyn Gonzalez*

1:35 p.m.

¿Cómo puedo mejorar mi español?: Los efectos de estudiar en el extranjero en la adquisición de la fluidez

Victoria Cerda

El estudio en el extranjero es cada vez más popular en los Estados Unidos. Sin embargo, menos del uno por ciento de los estudiantes del College of Idaho van a estudiar al extranjero según lo registros del College of Idaho. Este ensayo de investigación revisa los artículos

previos sobre el impacto de estudiar en el extranjero y examina datos en torno a cómo afecta al aumento de comprensión de la lengua española. En la primavera de 2018, cuarenta y tres estudiantes estadounidenses participaron en el semestre en el extranjero en San Sebastián, España. Al principio del semestre, los estudiantes en el programa tomaron un examen de competencia para colocarlos en el programa de acuerdo a su nivel y luego, al final del curso, lo tomaron otra vez. Una prueba estadística fue realizada para evaluar los resultados y producir un valor de porcentaje para así asociarlo a los efectos de estudiar en el extranjero. Los resultados sugieren una correlación positiva directa entre estudiar en el extranjero en España y el aumento de la aptitud en el español.
Faculty sponsor: Carolyn Gonzalez

1:50 p.m.

Los jóvenes en riesgo: América Central y la amenaza de las pandillas

Amber Tavener

Muchos jóvenes en el mundo hispanohablante se enfrentan a la decisión de entrar en una pandilla. Las pandillas pueden otorgarles un sentimiento de seguridad a estos jóvenes, pero también pueden añadir mucha violencia a sus vidas. Sin embargo, los gobiernos centroamericanos han respondido de maneras diferentes al problema de la violencia y del crimen que les presentan las pandillas. Estos gobiernos empezaron con una estrategia conocida como La Mano Dura, que fue una política de cero tolerancia al crimen y esto no les sirvió bien. Con esta política el nivel de crimen no cambió y solo aumentaron el número de personas encarceladas. Entonces trataron de resolver el problema con una estrategia conocida como La Mano Amiga, y esta estrategia también sufrió ciertos fracasos. Este programa se enfocó en la rehabilitación y en la participación voluntaria de las pandillas y desafortunadamente no hubo mucha participación en el programa. Los gobiernos no atacaron la raíz del problema que se encuentra con los jóvenes y con los riesgos que causan que ellos sean más violentos. Una solución más permanente puede ser un enfoque en bajar los factores de riesgo de los jóvenes que pueden causar su entrada en una pandilla. *Faculty sponsor: Carolyn Gonzalez*

2:05 p.m.

Characterization of Gordonia phage Axym

Megan Rockefeller

Although viruses are typically viewed as the cause of illness, bacteriophages (viral particles that infect a bacterial host) have the potential to cure bacterial diseases. Our research explores a phage which targets Gordonia terrae. G. terrae can lead to infection in vulnerable individuals such as those in a hospital setting. This is particularly vital for immuno-compromised individuals, as phages only attack their bacterial host, not human cells. Due to the incredible diversity of bacteriophages, we were able to isolate several Gordonia phages from soil samples taken on campus. By mixing soil with G. terrae we extracted the phage Axym and others then purified the phages so we could examine them with electron microscopy. We extracted DNA from each phage and two of the purified DNA samples were submitted for genome sequencing. Using various bioinformatic programs we analyzed the DNA sequence of Axym's genome and compared it to previously discovered genomes. We used this information to annotate the presence and function of the genes found in Axym. The completed genome can aid future research in phage genomics. The discovery of Axym contributes to the potential construction of phage "cocktails" that may be used against pathogenic G. terrae.

Faculty sponsor: Ann Koga

Oral Paper Session #3

Boone 103

Cara Laney, Moderator

2:35 p.m.

Predicting pH and concentration of oxalate systems with chemometric modeling

Zoe Hern

Hanford waste tanks contain millions of gallons of uncategorized spent fuel. During the production of plutonium in the 20th century, both processing chemicals and radioactive materials were dispelled into the tanks unmonitored, resulting in slightly different compositions in each of the 170 subterranean containers. One analyte of interest in the tanks is oxalate. Oxalate exhibits complex chemistry and tends to bind with rare earth metals, proving useful in processing uncategorized spent fuel. Efforts to clean up the tanks would therefore benefit from advanced methods of real-time monitoring and characterization of oxalate species. This project uses optical spectroscopy, primarily Raman and Ultraviolet-visible (UV-vis) absorbance, to model solutions containing oxalate species analogous to spent nuclear fuel reprocessing solutions. The data collected were chemometrically modeled to predict pH, concentration, and speciation (presence of H2C2O4, HC2O4 -, and C2O4 2-) based on the covariance of Raman spectral variables. Future development of these models may enable identification of spectral precursors to the precipitation of oxalate-metal products, such as those formed with the introduction of neodymium, and aid in the characterization and separation of uncategorized nuclear waste.
Faculty sponsor: Gib Nelson

2:50 p.m.

Let's Go for a Walk: False Memories for Performed and Imagined Events on a Campus Walk

Mali Sawyer and Hannah Shand

Why create false memories in a lab when you can create them on a walk? Imagination can derail the processes of accurately remembering events, and this can have potentially serious consequences. For this

study, 92 College of Idaho students went on a campus walk where they imagined and performed normal and bizarre tasks (e.g "kick a flower or rock" vs. "pick up a flower or rock and pretend it's a baby for 10 seconds") at 12 different locations. Three days later, participants completed an imagination task. A week later, participants completed two questionnaires and a memory test to see if they could accurately recognize which actions they had performed vs. imagined during the first walk. Participants falsely remembered completing both normal and bizarre tasks, particularly those tasks they subsequently imagined completing. These results show that imagining an action can have an impact on your memory. While it may not be important to have an accurate memory for every walk around campus, accurate memories definitely matter in settings like courtrooms.
Faculty sponsor: Cara Laney

3:05 p.m.

Word List Modification in the DRM

Alyssa Walcroft

Human memory is frequently trusted, but memory research has demonstrated that it is less trustworthy than people assume. I used the Deese-Roediger-McDermott (DRM) paradigm to test whether the addition of a random word into thematic word lists altered recall. Subjects read six lists of 15 words centered around a theme word â€“ the critical lure â€“ such as "rough", which was not presented, with the addition of a random word, such as "butterfly." Subjects either recalled the words immediately or completed a mathematical task, and completed a recognition task after an additional delay. I hypothesized that the addition of random words to the DRM word lists would cause subjects to falsely recall the critical lure less frequently by disrupting the words' association with the theme, but that subjects would recall the random word more frequently due to its distinctiveness. Results indicated that subjects did not have significant drops in false recall of the critical lure with the addition of the random word, and that the random word, which was presented, was less likely to be remembered by subjects than the critical lure, which was not presented. These findings suggest that memory is less trustworthy than many assume it is. *Faculty sponsor: Cara Laney*

3:20 p.m.

Jurors' Perception of Eyewitness Testimony: Judgment and Accuracy of True memories, False memories, and Intentional Lies

Alyssa Moreno

The American justice system uses eyewitness testimony during a trial to convey a narrative to jurors. Jurors are then asked to determine whether this testimony is truthful, a lie, or a false memory ,Äì often without even being given these categories explicitly. If jurors miscategorize this testimony, it can potentially lead to the wrong person being locked away. This study looks at mock jurors' ability to properly differentiate between true memories, false memories, non-believed false memories, and intentional lies. Seventy-three online main study subjects were given eight pilot subjects' 32 childhood memories in four different formats: video with audio, silent video, audio only, and text. They were asked to determine if each was true, false, non-believed false, or an intentional lie. Overall, subjects were quite poor in making these categorizations, but there was a significant negative correlation between subjects' Autism scores and video accuracy. Jurors' confidence in their ability to correctly use eyewitness testimony is often misplaced. Because of this truth and lies can be misinterpreted or overlooked in the justice system. *Faculty sponsor: Cara Laney*

3:35 p.m.

Doxorubicin Causes Dose-Dependent Cell Death in a Glioma Cell Line

Amber Tavener

Glioblastoma is a uniformly lethal form of brain cancer. We investigated whether doxorubicin, traditionally used in many different cancer treatments, causes cell death in a mouse-derived model system of glioblastoma (GL261 cells). We specifically hypothesize that the cell death will be dose-dependent. We quantified cell death using two different endpoints, apoptosis and cell viability. Apoptosis is a programmed and controlled form of cell death, when the cell signals to itself to "self-destruct." Cell viability is simply a test of whether the cells are alive. We used the comet assay and the MTT assay to quantify apoptosis and cell viability, respectively. We found a dose-dependent response in both assays. To test whether membrane efflux pumps protect GL261 cells from drug-induced cell death, we treated cells with

an inhibitor of these pumps prior to doxorubicin application. With this co-treatment we found fewer apoptotic cells. However, we also found there to be a decrease in cell viability from the MTT co-treatments. Future research will clarify the cellular mechanisms that lead to doxorubicin-induced cell death and the role of efflux pump inhibitors in GL261 cells and glioblastoma treatment. *Faculty sponsor: Luke Daniels*

Oral Paper Session #4
Boone 101
Anna Himler, Moderator

2:35 p.m.

The Larynx: A complex, marvelous musical instrument

Hannah Sorenson

The vocal ligaments are a muscle group that can be used in healthy or unhealthy ways, and are just as susceptible to injury as any other muscle. As a musician who is also passionate about the human body, I chose to do an interdisciplinary research project on effective and healthy phonation, which combined the anatomy of the larynx with vocal pedagogy (foundations of vocal studies). I removed the larynx from the cadaver, where I identified several of the extrinsic muscles of the larynx, along with veins and arteries located in the area. Once the larynx was removed, I began dissection to reveal the intrinsic muscles. The purpose of this study was to better understand vocal health by detailed dissection of the larynx. When the vocal ligaments are strained by improper use, it may cause permanent damage to the singer's voice. In this paper, I will discuss the anatomy of the larynx, the dissection process, proper and improper uses of the vocalis, and the consequences of such uses. *Faculty sponsor: Paul Moulton*

2:50 p.m.

Exploring Student Perceptions of Campus Racial Climate at the College of Idaho

Laurel Weiss

Student perceptions of racial climate on college campuses are highly impactful for educational outcomes, especially for racially minoritized students. However, previous research has established that structural diversity alone is not enough to create a positive racial climate, which has been identified as a necessary aspect of higher education producing well-rounded and interculturally competent graduates. Our research was a qualitative exploration of student perceptions of campus racial climate within the context of the College of Idaho. Though the College of Idaho is a Predominantly White Institution, it is unique in its recent recruitment of a high percentage of international students. We conducted several focus groups with undergraduate students, sampled from a variety of different clubs and organizations on campus. Focus groups addressed our research questions: How do college students perceive the overall racial climate on the College of Idaho's campus? And, Does this differ between groups of students? Themes were developed from a Thematic Content Analysis of the focus group transcripts. This project marks our third year of undergraduate student researchers developing and conducting institutional research on various aspects of the student experience at the college. Preliminary results will be discussed. *Faculty sponsor: Jen Wallin-Ruschman*

3:05 p.m.

Measuring Coral Health in the South Water Caye Marine Reserve using the Coral Health Watch Chart Protocol

Brinley Reed and Marine Vieille

Coral reefs are the foundations of tropical marine ecosystems. Coral bleaching and diseases have threatened the health of the Belize Barrier Reef since the 1970s. Research suggests that branching and plate corals may show less resilience and resistance to coral bleaching. We conducted a coral health assessment in the forereefs of the South Water Caye Marine Reserve in Belize, using the Coral Watch Coral Health Chart Protocol. As part of the assessment, we tested the hypothesis that branching corals is in the poorest health in the forereefs. Of the (give total N here) observed branching, plate, soft, and

boulder corals, 43% of the corals had an average color score of three. After excluding plate corals form analysis because they were so rare (N=2), there was no statistically significant difference between branching, boulder, and soft corals average color score (One-way ANOVA, p = 0.088). These results suggest that there is no difference in health conditions between the three coral types we observed. Our results give useful baseline data of the three important coral groups to serve as another comparison to past and future surveys. *Faculty sponsor: Anna Himler*

3:20 p.m.

Evaluating Measures to Maintain Water Quality During Times of Urban Expansion and Population Growth in the Treasure Valley, Idaho

Emma Grace Damele

Maintaining water quality in the Treasure Valley is becoming a growing concern due to recent population growth. Urban expansion in the Treasure Valley is following certain patterns based on proximity to water, urban areas, and major roads (Dahal & Lindquist). Land use planning and urban management are essential to maintaining water quality in the Treasure Valley as wells in the area are at risk for contamination caused by poor land use and well construction practices (IDWRRI). First, it is important to evaluate the ratio of surface water to groundwater use in the Treasure Valley because population growth combined with environmental stress influences whether water is sourced from the surface or from the aquifer, and the risk of contamination of that water (Murdoch, Baron, & Miller). Subsequently, monitoring population growth and water quality is essential to determining methods of preventing water contamination, which becomes more probable with increased urbanization. Through an evaluation of literature, satellite imaging, and local news, this paper will explore methods to improve and maintain water quality including, but not limited to, point-of-source decontamination, reduction in agricultural pesticide and fertilizer use, and a decrease in the application of impermeable ground cover such as pavement and concrete. *Faculty sponsor: Megan Dixon*

3:35 p.m.

The Liberation Effect: Support for the ANC in South Africa

Blake Cowman

South African President Jacob Zuma was forced to step down in 2018 after a tenure riddled with corruption allegations, high unemployment, and widespread dissatisfaction. Despite this, the ANC will likely maintain dominance in the 2019 national elections. I explore three explanations for the ANC's support. First, a liberation effect in which the ANC uses apartheid imagery to ensure black voters are loyal to the ANC due to their role in the country's liberation. Second, electoral manipulation, examining municipal gerrymandering and disproportional representation. The third considers whether voters' partisanship distorts their perceptions of the national economy, reaffirming their ANC support. Using nationally representative Citizen Surveys data, original field interviews, electoral data, and a qualitative study of pre-election newspaper articles and secondary materials, I find evidence that the ANC is aware of and exaggerates its role as a liberation party. Neither economic perceptions nor disproportionality in the electorate are sufficient to explain the ANC's success. The causes of the ANC's support are important in determining whether South Africa will continue to be a dominant party system or move towards a multi-party system. *Faculty sponsor: Erin Hern*

Senior Art Exhibition
Rosenthal Gallery
4:00 p.m. – 5:00 p.m.

Graduating art majors will hold an Artists panel discussion. Audience members are encouraged to participate in dialogue with participating artists.

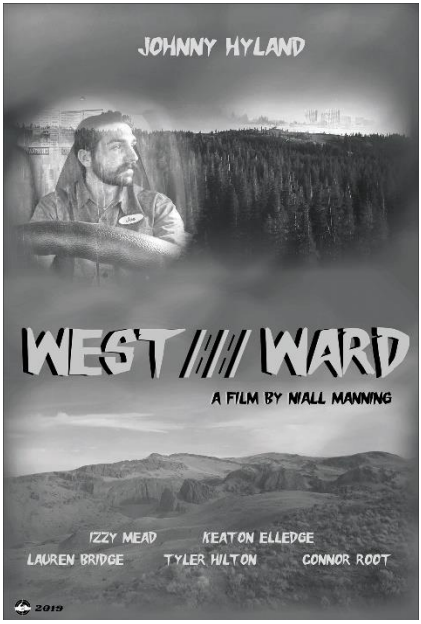
Artists' Statements

Rachel Dahm

My love for the outdoors serves as inspiration to my work. I am particularly drawn to trees for their seasonal beauty and resilience. In this work the tree serves as a symbol of growth, while the seasons a symbol of change.
Through both my book and ceramic work, I draw connections to my own life. Each piece resonates the youthfulness that I see within myself, much like a seed having grown into a tree.

Heather Green

Expression of Color:
I utilize vibrant colors in realistic portraits to convey varying emotions. I choose to create large scale portraits because I'm drawn to expressions and the challenges that come from combining realism and impressionism. In the past, I've focused on portraits of the elderly because I am intrigued by the stories their faces tell. In my current work I've chosen to focus on strong, youthful figures to echo the bold pigment and the lively presence they convey.



Niall Manning

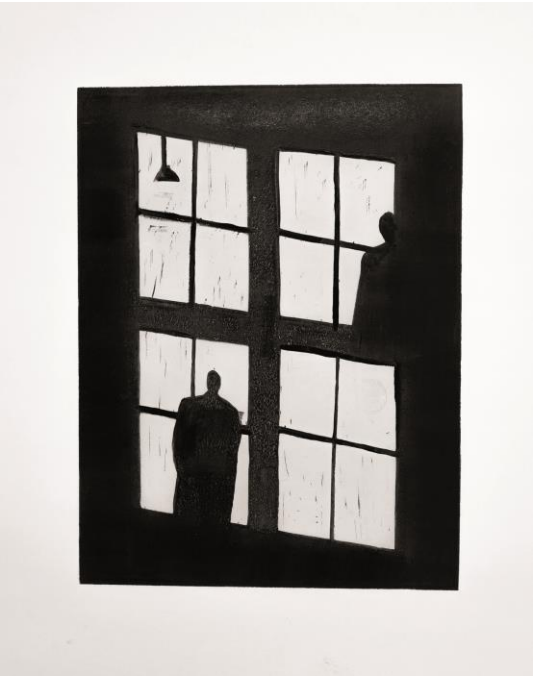
As Joe (Johnny Hyland) traverses the scenic American west, one misfortune after another seems to befall him. He becomes reliant on a bailout; any sort of occurrence to turn his luck around. Drawing parallels to the deterioration of the conventional "American Dream" and seemingly growing societal discontent, Joe's path eventually comes to a breaking point. Shot in four states across a span of ten months, WestWard is a project that has been in the works for approximately two years. Using three distinct cameras and a multitude of editing methods, the film blends several genres and styles, resulting in an unusual final product.

Isabel Mead

I chose to study art over other fields not realizing that there are as many rules as science, as much to consider as language, and as many technicalities as math. Rules take away from the joy I find in art. Rules leave room for criticism and a need for planning and preparation. This piece became a compilation of every moment by moment gut decision, and every moment by moment emotion, while serving as a catalyst in overcoming the fear of exposing my vulnerabilities to others.

Alyssa Moreno

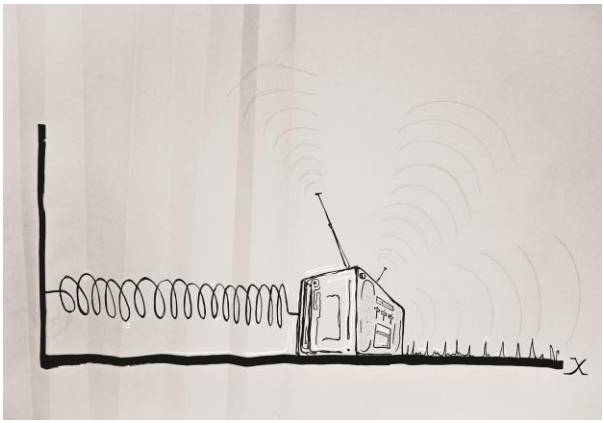
Interpreting the Truth: My work explores the relationship between human emotions and human interpretation. With influences from psychological theories about emotion and human behavior to define a familiar form to the pieces. Bold colors and strong lines form the narrative of the pieces while organic shapes help to create movement throughout the works. A focus on facial features and the bold color palettes to describe a familiar emotional display will contrast the body language. By using key features to bring a focus to the emotional presentation, while hiding other interpretations with body stance and shadowing the piece encourages the view to look again with a different mindset.



Ashley Smith

Strange Spaces is a collection of linoleum reduction prints that explain and explore mood through equitable use of color, and spatial relationships between subjects. The series rejects deliberate narrative representation, and instead implies to the viewer their own interpretation and intention of each artwork, both individually and as a series

Tyler Truksa



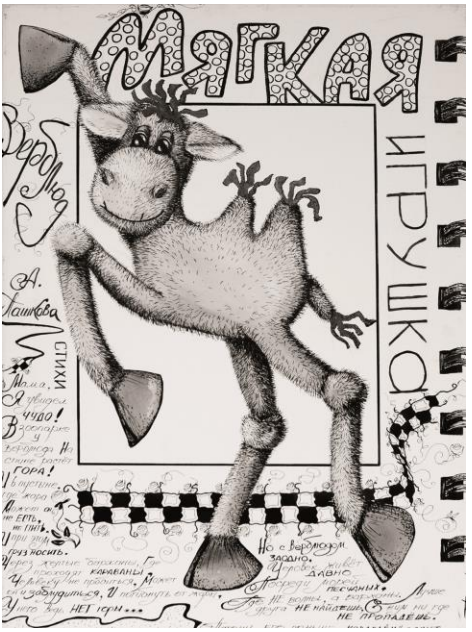
Art and science are typically placed in an antagonist role against each other, if they are mentioned together at all. Perhaps driven by lack of understanding, proponents of each seem to seek to undermine the significance of the other. However, after late nights spent in the physics lab, and equally late nights spent in the art studio, sleepless delirium has revealed a bridge in the gap between hard sciences and the fine arts. By showcasing the beauty of physics through the lens of sculpture and illustration, my pieces showcase the similarities that exist within the two fields and redraw the boundaries of the academic landscape.

Jeanna Vickery

My art is heavily influenced by landscapes, especially water. Through a variety of mediums, I have been exploring the beauty of and our relationship with our environment. Like much of my work, *Sea Through* focuses on light, but this installation also plays with the transparent nature of water and what we see passing through. Based on my personal photographs and memories, each component uses color in an ethereal way. The pieces are placed rhythmically with variances in size, viewing height and position to guide the viewer to move through the piece in a pattern, like a wave or a river, to reveal the focal point.

Tatyana Wahlman

During the course of everyday life, we are exposed to art whether we realize it or not. As an artist, illustrator, and graphic designer I want not only to make people more aware of art around them, but to make it both approachable and attainable on a personal level. My hope is to instill confidence and creativity whatever their skill level or style may be.



Printmaking: Artist Demonstration
Ashley Smith
Few have the opportunity to become familiar with the behind-the-scenes of an artist's work. Generally, artists are patrons of artists, and what we produce is reserved for display in art spaces. Breaking the barrier between gallery and studio is what I aim for. This live demonstration of a printmaking process will invite the art-enthused or art-indifferent to appreciate the process through observation, and discussion with the artist while she works. The demonstration will feature artwork created for display in the 2019 Senior Art Exhibit - Zero Correlation. *Faculty Sponsor: Alice Vinson*

Poster and Display Session
Langroise Foyer
5:00 p.m.-6:00 p.m.

1. Untangling Jumble: Purifying a Mixed Phage Culture
Kaiden Lee
Bacteriophages (phages), viruses that infect bacteria, are the most abundant bioparticles on the planet (~10^31). This makes the acquisition of knowledge on bacteriophages, including their genomes, an enormous undertaking with untapped genetic potential. The fall 2018 BIO-210 class isolated several bacteriophages, including Jumble, and submitted samples for DNA sequencing. The DNA sequence of Jumble revealed two distinct phage genomes from different clusters (bacteriophage groupings), Jumble_CQ and Jumble_DG. The DG cluster currently has only four sequenced members, making it a potentially important genome to analyze. This unexpected result spurred a new project to purify the mixed phage culture and match the purified phages to their respective genomes. To do this, we designed Jumble_DG and Jumble_CQ specific primers, conducted polymerase chain reaction (PCR) and analyzed the data using gel electrophoresis. Results of this project will expand limited knowledge on DG phages, opening the door for identification of previously unseen genes with potential applications in everything from agriculture to medical treatment.
Faculty sponsor: Ann Koga

2. Ability of Individuals to Restrain System 1 and Impulse Decision
Noah Barsanti
Humans have two types of thinking: System 1 , with fast decisions and largely uninhibited responses , and System 2 , with slower, more careful, more rational, and less biased responses. The present study assessed 161 College of Idaho students' ability to inhibit System 1 responses in favor of more calculated System 2 responses. Subjects were given a series of tasks that could only be answered correctly with System 2 thinking. These tasks included the Cognitive Reflection Test (CRT) and various versions of Wason's 4 Card Task. Most subjects were unable to inhibit their System 1 thinking on the CRT or the Wason's 4 Card Tasks, and these two types of errors were largely correlated with each other. These findings demonstrate that when presented with logical problems, even College of Idaho students have trouble with intentionally using System 2 thinking. *Faculty Sponsor: Cara Laney*

3. Using the Scratch Wound Healing Assay to Measure Cellular Motility in a Glioblastoma Model System
Shanaya Fox
Using the Scratch Wound Healing Assay to Measure Cellular Motility in a Glioblastoma Model System Glioblastoma multiforme (GBM) is an aggressive form of brain cancer and is uniformly lethal, characterized by rapid 1) division of its cells and 2) migration of these cells into surrounding healthy tissue. Current chemotherapy treatments target tumor cell proliferation but not tumor cell motility, which contributes to recurrence and metastasis. We present experiments that characterize the motility of a murine-derived glioma cell line (GL261) using the Scratch Wound-Healing Assay. Application of two anti-proliferative drugs currently used in chemotherapy regimens, doxorubicin (DOX) and temozolomide (TMZ), showed no significant effect on GL261 migration, suggesting a need for continued exploration of treatments that target tumor cell motility. Previous reports indicate that the calcium-activated potassium channel KCa3.1 plays a role in glioma cell migration; however, we found that specific inhibition of KCa3.1 with TRAM-34 did not significantly alter GL261 motility. Our results suggest that the role of KCa3.1 in glioma tumors remains an open question that needs to be explored further. This project was funded by a NIH-INBRE research grant. *Faculty Sponsor: Luke Daniels*

4. Purple Sea Fan Distribution in Tobacco Caye

Aleah Mendiola

The purple sea fan, Gorgonia ventalina, is very important to coral reef ecosystems. The species provides a substrate for organisms such as sea snails, algae, and other marine organisms. The objective of our research was to determine if sea fan density was impacted by water depth. Because they spread their "fan" perpendicular to the waves, if the wave energy is too strong, the purple sea fans could be ripped off their substrate. We predicted that because shallow water has strong wave energy, sea fans would reside in deeper waters. We studied their depth distribution patters by surveying along the spurs of the Tobacco Caye fore-reef, 10 miles off the coast of Belize. We used a GoPro 7 Black, dive slate, and a make-shift meter stick (body-lengths) to estimate water depth. We divided our sampling areas into two depth categories, less than and greater than 4 meters. We found that the majority of sea fans were found in greater than 4m depth. With climate change, storm intensity (wave energy) is expected to increase and may affect the sea fan's habitat. If they are forced into deeper waters, they may not absorb enough light energy to fuel photosynthesis, thus limiting their survival.

Faculty Sponsor: Chris Walser

5. A Pilot Study: Arm-Only v. Leg-Only Exercise Effect on Postprandial Blood Glucose

Emma Powley

Background: To investigate the relationship of arm-only versus leg-only exercise on postprandial blood glucose concentrations in order to potentially standardize an intervention to regain metabolic and cardiovascular health. Our hypothesis is that the leg-only condition will have a greater control on glucose due to the larger muscle groups being recruited in comparison to the arm-only condition. Methods: 10-18 college aged subjects drank a 75g dextrose drink after fasting for 9 hours and then had 8 glucose measurements taken over the course of 90 minutes during control, arm-only, and leg-only conditions. The arm-only exercise is done on a rowing machine and the leg-only exercise is done on a ergometer bike and is matched by power output measured in Watts. Changes in glucose concentrations are compared between arm and leg exercise conditions using a two way ANOVA test for statistically

significant differences. Results: Data is currently being collected. Conclusion: Our data will provide evidence for the importance of muscle mass recruitment in the regulation of post-prandial glucose concentrations. *Faculty Sponsor: Matthew Laye*

6. Investigating Bubble-Gas Clump Association to Understand the Conditions of Massive Star Formation

Annika Thomas

Stars with masses greater than ten times that of our sun play an important role in the evolution of galaxies, but the physical and chemical evolution that leads to the formation of these massive stars is not yet well understood. The association between bubbles of gas surrounding high-mass stars and gas clumps will help inform our models of triggered star formation. A group of sources with this association was found by cross-matching a catalog of bubbles with a catalog of gas clumps. To confirm that the objects were physically interacting, I visually verified this association for 349 sources. I am creating a list of observations for cases where gas clumps are associated with the insides of bubbles. In the future, we will use this list to compare the strength of emission lines from various molecules to constrain the conditions inside of bubbles. With this information, we will be able to optimize computational models that make predictions for various line strengths to better understand the physical conditions inside of bubbles. *Faculty Sponsor: Katie Devine*

7. Mountains, Borders, and Refugees: Comparing Dara'ang Narratives in the Highland Regions of Myanmar and Thailand

Kaytlyn Marcotte

In Southeast Asia, refugee numbers are on the rise. Among the hotspots for refugee flows is the porous Thai-Myanmar border, a 1,300 mile boundary of mountain ridges, river valleys, and ungovernable forests where insurgents hide and the oppressed seek sanctuary. The Dara'ang, also known as the Palaung, Ta'ang, or Pale, are an ethnic group of 300,000 whose main populations are found in the Shan State of Myanmar. Small in number, the struggles and trials of the Dara'ang have not attracted the attention of the UNHCR, international relief agencies,

or journalists. This project sheds light on the narratives of the Dara'ang and their current struggles in Thailand. Our data was collected via archival and on-site field research in Northern Thailand and Myanmar. In addition to this poster our team has developed an in depth research paper and documentary film in order to shed light on this population. This project was funded through a 2018 ASIANetwork Student-Faculty Fellows Grant funded by the Freeman Foundation. Additional funding for technical support came from The College of Idaho through a Mellon Foundation Digital Humanities Grant.
Faculty Sponsors: . Robert Dayley and Alice Vinson

8. Cell Phone Usage, Motivation and Exam Grades in College Students
Tyler Vorce
Cell phones are a part of daily life, and for those in school, cell phones can be used as a tool for education or a distraction. Previous research has shown that laptops in classrooms have negative consequences for learning. Do cellphones pose the same risk? Fifty College of Idaho students (15 males, 35 females; 27 athletes, 23 non-athletes) completed an online questionnaire assessing motivation, cell phone usage in class (their own and fellow students'), recent exam grades, and cumulative GPA. Nearly half reported using their cell phones in class though only one admitted doing so during their last exam (two saw their peers doing so). GPA differed significantly between athletes and non-athletes, but not cell phone users and non-users. Self-identified phone users were more likely to report an exam grade of C or lower, while non-users reported obtaining mostly As and Bs. About half of students reported class polices on cellphone use, but a majority of these were said to be unenforced, and policy existence was unrelated to reports of use. Both students and professors should carefully consider the use of cell phones during class and how it might affect learning and exam performance.
Faculty Sponsor: Cara Laney

9. Character Analysis of an Owyhee Variant of Ericameria
Danielle Trawick
Distinctions between species in the genus Ericameria are sometimes difficult to define. This study investigates features distinguishing Ericameria bloomeri, E. greenei, and E. suffruticosa, and the taxonomic place of a variant in the Owyhee Mountains of southern Idaho, which has been considered E. bloomeri or E. greenei by different authors' criteria. We selected 62 samples from College of Idaho and two other

herbaria, 12 E. bloomeri, 31 E. greenei, 10 E. suffruticosa, and 9 of the Owyhee variant. I measured 24 characters. Sixteen were significantly different among the four groups (One Way ANOVA, $P< 0.05$). A Principal Components Analysis using these characters revealed that Ericameria bloomeri was easily differentiated. Five characters distinguished E. bloomeri from E. greenei and the Owyhee variant, six from only E. greenei. The remaining groups overlapped to a greater extent in the Principal Components Analysis. Six characters distinguished the Owyhee variant from E. greenei. None of the traits measured distinguished Ericameria greenei, and E. suffruticosa. We conclude that because E. greenei and E. suffruticosa are species accepted in flora literature, and the variant differs from E. greenei at least as much as E. suffruticosa, the Owyhee variant deserves taxonomic recognition at least at the subspecific level. *Faculty Sponsor: Don Mansfield*

10. Feeling Clammy? Detoxification Activity in Venus Clams

Alyssa Case and Nicole Jordan

Glutathione s-Transferase (GST) is a phase II detoxification enzyme that adds a glutathione conjugate onto toxins to be excreted from an organism. GST also acts as an endogenous antioxidant and can protect against oxidative stress caused by exposure to manmade pollutants. In this study, we examined the tissue specific activity of GST in Venus Clams. We hypothesized that GST activity would be highest in the digestive glands, followed by the mantle, and finally gills. To test this, we resected each tissue type and created homogenates. We conducted Bradford and GST assays to determine the total protein concentration and total GST activity in each sample. Results indicated the digestive glands had the highest GST activity, followed by mantle and gills respectively ($p = 0.04$). The role of GST in lowering oxidative stress may contribute to the higher levels of GST activity in the mantle. Our results indicate that GST is detectable in the three tissues examined in this study and may serve as a useful biomarker indicative of exposure to pollutants. Future studies should examine the regulation of GST in Venus Clams. *Faculty Sponsor: Mark Gunderson*

11. The Distribution of Diadema antillarum in the Morning and Evening on Tobacco Caye, Belize

Kristen Chisholm

Long-spined sea urchins (Diadema antillarum) are black, nocturnal organisms covered in spines that grow to 30-40cm in the Atlantic. The purpose of our study was to investigate how sea urchin distribution and density differ between morning and evening because previous studies found they were more active at night. The experiment was conducted on January 18th-19th, 2019 off Tobacco Caye, Belize. We predicted that sea urchins would have a higher density and clumped distribution in the morning than the evening. The population was sampled using a GoPro suspended from a kayak just below the water surface along a 60-m conch shell ridge. We analyzed the video by measuring the distance between each urchin and its nearest neighbor. The average distance between each urchin in the morning was 23.38cm and 32.69cm in the evening. Using nearest neighbor analysis, urchins tended to cluster during both times of the day. However, urchins were closer by an average of 9.31cm in the morning than in the evening (nam= 416, npm= 369, $p< 0.05$). Our results confirm previous studies that sea urchins disperse to forage at night. This study contributes important information about the dispersal behavior of Diadema antillarum in Belize. *Faculty Sponsor: Chris Walser*

12. Automating Photometric Analysis of Yellowballs

Aurora Cossairt

The life cycle of massive stars plays a critical role in the development of galaxies, but their formation is not fully understood. Recently, the Milky Way Project, a citizen science initiative, identified approximately 9,000 new objects called Yellowballs (YBs) which may help inform our understanding of massive star formation. These light sources likely represent compact massive and intermediate-mass transitional star forming regions. Using photometry, we can analyze images of these sources to determine the mass, stellar content, and evolutionary stage of the YBs. However, performing this kind of analysis on YBs is challenging because they are often embedded in complex stellar backgrounds that make it difficult to tell which light is coming from the source and which light is coming from the background. The goal of this project is to develop photometry software that interpolates over the stellar background to more accurately predict the difference between source light and background light in YB images. My role is to improve an

existing photometry program by translating the code from IDL to Python and streamlining the interpolation process. When finished, this program will automate photometric analysis, increasing accuracy of our measurements and improving our understanding of massive star formation. *Faculty Sponsor: Katie Devine*

13. Investigation of Be-Class Stars through Small Telescope Spectroscopy

Micah Woodard, Molly Vitale-Sullivan, Nick Lotspeich

Massive B-class stars play an important role in the stellar evolution of our universe, yet our understanding of these stars and their surrounding environments is incomplete. Be-class stars, a subset of B stars, are particularly interesting to study because they can provide insight into the relationship between stellar rotation and evolution, as well as circumstellar environment. We gathered and analyzed spectra between January 24 and January 29, 2019 in Mayhill, New Mexico using a 14" telescope with a high-resolution spectroscope. Our resulting emission and absorption profiles show high rotational speeds, forbidden emission lines and unexpected rapidly changing spectral features. Future work will focus on adding to our spectral survey of these complex systems and improve our understanding of Be star evolution.
Faculty Sponsors: Jim Dull, Katie Devine

14. Polymers in Motion: A Streamlined Method for Polymeric Molecular Dynamic Simulation

Thomas Price and Caleb Tormey

Molecular dynamic simulations (MDS) model the movement of atoms and molecules by numerically solving Newton's laws of motion. Information from simulations can be used to explain the relationship between microscopic interactions and macroscopic thermodynamic properties of a system. GROMACS is a free, open source MDS software with powerful analysis tools. Polymers systems are a topic of historic and continued interest. Polymers have been successfully simulated in MD software, however, GROMACs which is primarily designed for biomolecules, is not optimized for polymeric systems. Polymer systems require the creation of large laborious topology files and expensive computers, making it largely inaccessible to undergraduate research. Here we test a workflow using a program called ASSEMBLE! to create customizable polymer ensembles in GROMACs to efficiently study polymeric systems. Currently ASSEMBLE!

has a limited number of available force-fields and monomer types. We present development of new monomer and force-field for use in polyolefin simulations and compare these results with previous simulations. Information from MD simulations lead to a better understanding of structure-to-function relationships of macro molecules which aids in the exploration of new materials. This new implantation of GROMACs shows how MDS is now in the reach of undergraduate research, greatly expanding this field.
Faculty Sponsor: Caleb Tormey

15. Massive Star Formation: Yellowballs and the Statistical Analysis of their Radii

Sarah Schoultz

Massive star formation has played a major role in the development of our universe, yet it is still not fully understood how massive stars form. Nevertheless, recently discovered astronomical objects called Yellowballs (YBs) could assist in bridging this knowledge gap as they are thought to be stage in massive formation. YBs were discovered by the Milk Way Project (MWP), a citizen science project where non-scientists log on and identify astronomical objects in pictures after completing a short training. Users of the MWP dubbed these new objects Yellowballs as they appear yellow in the infrared images where the 24-micron wavelength was assigned the color red and the 8-micron wavelength green. Ultimately, we plan to produce a catalogue of all 9,000 YBs and their physical properties such as distance, luminosity, and radius. Our work examines the accuracy and therefore usefulness of the radii the citizen scientists identified by using linear regression. This linear regression will show us if there is a relationship between the citizen identified radii, computer calculated radii, and the radii of YB-associated gas clumps published in previous studies. Ultimately, accurate radii will allow us to calculate other physical characteristics of the YBs and therefore complete our catalogue. *Faculty Sponsor: Katie Devine*

16. The Effects of Elevation on Heart Rate

Erin Skufca, Alexis Smith, Luke Daniels, Matt Laye

This project examined the effects of elevation on heart rate (HR). When non-acclimatized individuals move to an increased elevation (> 5,000 ft.), multiple physiological changes occur, including increased HR, production of red blood cells and respiratory rate. In Winter 2019, 12 students travelled to Ecuador as part of an interdisciplinary course

(SPA210/310, HHP399T & BIO199T). Quito, Ecuador is located at 9300 ft., thus making a good environment to study this phenomenon. We hypothesized that on arrival in Quito 1) that the average HR of students would increase and 2) that, after exercise, HR will be elevated at high altitude as compared to low altitude. To address these hypotheses, we used Fitbits¬Æ to measure HR for a week prior to leaving for Quito and a week after arrival in Quito. Additionally, students performed a simple test of cardiovascular challenge (step test) to obtain data regarding HR after submaximal exercise. We found that HR increased on arrival in most individuals. In addition, we found that HR was significantly elevated after the step test in Quito as compared to Boise, a change that persisted after 1 week. Together, these results confirmed that elevation has a physiological effect on the body elevating HR. *Faculty Sponsor: Luke Daniels*

17. Avian Population and Abundance on Tobacco Caye, Belize

Hannah DalSoglio and Monique Lopez

Although there have been many studies on the marine life of the Tobacco Caye Range, off the coast of Belize, little has been published on the avian population of the area. Our study focuses on documenting the structure and distribution of the avian community of Tobacco Caye in January, the beginning of inland Belize's rainy season. We predicted that coastal bird species would be more abundant along island edge habitats while generalist species would be more abundant toward the center of the island. By performing three daily survey walks each day for three days in January, 2019, around and across the island, we recorded 13 species of birds on or near Tobacco Caye; including the Great-Tailed Grackle (Quiscalus mexicanus), the Ruddy Turnstone (Arenaria interpres), and the Magnificent Frigatebird (Fregata magnificens). By running a Shannon's Diversity Index we found that the coastal population, was significantly more diverse than the inland population. The surveys confirmed our hypothesis regarding specialized birds and confirmed that species richness was higher along coastal areas. With threats like coastal erosion and increased human development on coastal islands, our study provides important baseline information to evaluate the impacts of these changes on the bird community of Tobacco Caye. *Faculty Sponsor: Chris Walser*

18. I Don't Want to be on the Wrong Side of the Story: A Follow Up Study to Intersectional Thinking and Social Activism in the Classroom
Cassidy Richey
In a climate where Generation Z has become increasingly outspoken towards power dynamics, this study questions how educated students use knowledge about these power dynamics a year later. This examination may be one of the first longitudinal studies of teaching intersectionality and community engagement. Most literature focuses on short term responses to educating those about marginalization, however, it has become increasingly ineffective to leave out community engagement in lessons. Teaching intersectionality, on the other hand, has shown an array of positive results. This study focuses on students who took upper division classes a year prior where they learned about intersectionality, social change, and community engagement. The research questions of this study asks: How does previously learned knowledge about intersectionality and community engagement within a psychological lens influence students to engage in social change a year later? How do they engage in their community and social change? Which method is best? To answer these questions, individual interviews with 9 students took place--4 who took intersectionality, 3 who took community psychology, and 2 who took both classes. Thematic content analysis was used to analyze qualitative results with a coding method organized by Dedoose. Results of this study will be discussed. *Faculty Sponsor: Jen Wallin-Ruschman*

19. Contextualizing Climate: How do off-campus experiences impact on-campus racial climate?
Virginia Harness
While college campuses are often considered cultural microcosms within the larger community, the campus experience does not exist in isolation from its broader environment. Our research provides an ecological analysis of how on-campus racial climate is impacted by off-campus interactions with other students, community members, and authority figures (e.g., police officers). Though the College of Idaho is a Predominantly White Institution, it is unique in its recent recruitment of a high percentage of international students. The surrounding town of Caldwell, Idaho has a population of approximately 54,000, with an ethnic makeup that is roughly 60% white (non-Hispanic or Latinx) and 36% Hispanic or Latinx. We conducted several focus groups with undergraduate students at the College of Idaho, sampled from a variety

of organizations and clubs across campus. We also collected quantitative data using online surveys. Analysis centered on the research questions: How do off-campus interactions impact students' feelings of safety, wellbeing, and belonging, and how do experiences off-campus impact relationships between individuals from different backgrounds? This project marks our third year of undergraduate student researchers developing and conducting institutional research on various aspects of the student experience at the college.
Faculty Sponsor: Jen Wallin-Ruschman

20. Took a double shot and then we all went crazy: Prevalence of brain injuries, alcohol use, and marijuana use among College of Idaho students

Virginia Harness

Individually, both substance abuse and Traumatic Brain Injury (TBI) can be deeply detrimental to students' education, physical and mental health, and relationships with others. When combined, the destructive effects of substance abuse and TBI multiply. We explored the prevalence of substance abuse and TBI, using data from 99 College of Idaho undergraduates. We measured brain injury (including concussions), alcohol use, and marijuana use via self-report scales. While there was no significant relationship between substance abuse and TBI in this sample, results showed concerning prevalences of both TBI and substance use. Half of respondents self-reported receiving at least one concussion, 75% reported alcohol consumption at levels classified as "hazardous" or above, with 31% of respondents' results suggesting possible alcohol dependence, and 16% of students reported consuming concerning levels of marijuana on at least a weekly basis. These results suggest the need for greater research on patterns of substance use among college students and the impact of these patterns on relationships, health, and academic achievement.
Faculty Sponsor: Cara Laney

21. "No One Said a Relationship Would be Easy": A study investigating relationship satisfaction and gender roles

Megan Lohman

Previous generations have been the main source of current research on the impact of gender roles on romantic relationships and relationship satisfaction. Most studies were conducted between the 1970's-2000's, leaving room to question the more recent societal changes that may be

occurring. How relationships are defined changes with each generation, so my research aimed to understand the newest generation, Generation Z, and how they defined relationships and relationship satisfaction. Relationship satisfaction among college students was examined to determine the impact of gender roles on college student's present or past relationships. My research questions are how do college students define relationship satisfaction? and how are college students (Generation Z) interpreting changing gender roles in relationships? To answer these questions, an open-ended survey was developed. Thematic content analysis was used to analyze the 79 qualitative responses. The results of this study will help give a better understanding of how Generation Z interprets romantic relationships and relationship satisfaction and if this differs from the research based on previous generations. *Faculty Sponsor: Jen Wallin-Ruschman*

22. Mixed use Planning and its Potential Benefits as a Development Strategy for the Treasure Valley

Elijah Rolapp

The Treasure Valley (TV) is experiencing unprecedented growth as more people settle down in new housing projects. Traditional American developments such as suburbs and sub-divisions place a greater strain on the resources available to the valley by creating unsustainable demand for resources such as water. A new form of development is needed to accommodate this influx of consumers in the TV. More dense and resource efficient vertical mixed use developments might provide a potential solution. Vertical mixed use development involves the building of a structure with commercial and light industrial business on the ground floor with residential units located above. Through an exploration of literature, news articles, and interview of local officials and witnesses this paper will explore the potential pros and cons of a mixed use development system in the area of Canyon County Idaho. More people coming to the area will necessitate the construction of new homes and businesses and mixed use would be the best route to pursue in the interests of conservation of resources and space. Mixed use can help to alleviate several issues in cities such as traffic, heat islands, over-use of water resources, improve health, community involvement, and waste generation. *Faculty Sponsor: Megan Dixon*

23. Nesting Patterns in Neo-tropical Ants on a Small Island

Elijah Rolapp and Andrea Rojas Escot

Tobacco Caye (TC) is a 3 acre neo-tropical island off the coast of Belize with several ant morphotypes. Ants have a disproportionate effect on many islands as consumers of detritus and as possible invaders. These ant species seem to prefer nesting sites near and on vegetation, although Tobacco Caye has largely been developed from a Mangrove dominated caye, perhaps these locations may provide protection from disturbance such as predation, weather, and human activity. We surveyed the number of ant nests on TC, their locations, and distance from vegetation, structures, and water. We walked the island perimeter in a decreasing spiral towards island center for three days to locate nests. We collected data from 67 ant nests of five morphotypes, recorded their GPS coordinates. We used Mann-Whitney test to compare the distance of nests from vegetation, and a Kruskal-Wallis test to compare medians of morphotypes, and a Dunn's post hoc test to indicate which categories are significantly different from each other for each ant species. We found a significant trend towards nesting in vegetation in morphotypes 1 and 2 with insufficient data for the morphotypes 3-5. Future studies should include more comprehensive and inclusive sampling techniques and identification of species.

Faculty Sponsor: Anna Himler

24. The Effects of Cinnamon-Flavored Electronic Cigarette Liquids On Osteoblast-Like Saos-2 Cells

Maddie Villarreal

Electronic cigarettes (e-cigarettes) are quickly gaining popularity among adults and adolescents. Since adolescence is a critical time for bone development, we are interested in the effect of e-liquids on bone-forming osteoblasts. Our previous research indicates osteotoxicity is flavor-dependent. Therefore, this study focuses on the most cytotoxic cinnamon-flavored e-liquids. Human osteoblast-like Saos-2 cells were treated with nicotine-free unvaped or vaped e-liquids, or cinnamaldehyde for 48 hours. Cell viability was measured using an MTT assay and the major bone protein collagen type I by immunofluorescence. Cell viability significantly decreased in response to both unvaped and vaped e-liquids with the cinnamon-flavored e-liquids being more osteotoxic than flavorless e-liquids. Cinnamaldehyde also decreased cell viability. Collagen type I significantly decreased in cells treated with vaped cinnamon-flavored e-liquid, whereas there was no

change with vaped flavorless e-liquid. This study demonstrates that osteoblasts are sensitive to unvaped and vaped e-liquids, especially to cinnamon-flavored e-liquids. Cinnamaldehyde could be the chemical inducing toxicity. Furthermore, this study reveals collagen type I as a potential target for vaped cinnamon-flavored Napalm in osteoblasts. Preliminary studies are assessing the role of oxidative stress in our osteoblast model. This study provides insight into the potential impacts of e-cigarette use on bone health. *Faculty Sponsor: Sara Heggland*

25. Opinion and Effectiveness: Reading on Paper, Laptop Computer, and Kindle

Michael Piazzini, John Downey, Langa Masilela

College students are using technology more and more in their daily lives. Controversy regarding its effectiveness for learning remains; has it actually helped students learn better or is it in fact impeding the learning process? In the present study, 105 undergraduate students were recruited to examine the effectiveness of technology in student learning. Using a within-subjects design, we compared college students' comprehension from, and perceptions of, readings (regarding the history of various cultures and sports) on paper, laptop computers, and Kindles. We found that students retained less information following the Kindle reading, and generally preferred paper readings. And though students felt that their learning experience with paper and laptop computers was similar, they found the Kindle to be a less satisfying learning medium and generally more difficult to use. These findings held true for both types of excerpts. The findings from this study suggest that students can learn equally well from digital media or print media, but students might be especially careful when considering less familiar technologies like Kindles. Future research could compare digital to print media for other activities like group work or look at more commonly used technologies like smartphones. *Faculty sponsor: Kara Sage*

26. Voting Behavior: Intuitive or Analytical?

Sage Czelder and Michael Piazzini

Voting in a bipartisan system like that of the United States seems very straightforward due to our assumption that party affiliation and candidate ideology will always go hand in hand. However, in a real-world election setting, ideology and party affiliation sometimes diverge. Our research applied Dual Process Theory to a political simulation to

analyze the way that people make voting decisions, including the underlying cognitive processes. We created a pseudo-election in which one group chose between candidates whose party affiliation consistently matched their stated ideologies, and another had these switched, with, for example, liberal ideologies tagged as “Republican.” We found that a significant proportion of people in both groups used intuitive thought processes, voting for the candidates who shared their own self-reported party affiliation, regardless of ideology. The exception to this rule was independent party voters, who were more likely to use analytical thought processes and vote for candidates whose ideologies matched their own. These results call into question aspects of our current bipartisan system and its effectiveness in choosing representative candidates. *Faculty Sponsor: Cara Laney*

27. Bringing Compact Design to the Treasure Valley

Jessee Emerson

Bringing Compact Design to the Treasure Valley Compact design is a relatively new and fast-growing idea for city and urban planners. This idea takes building affordable housing and land/ resource preservation to a new level and is a potential solution to problems in the Treasure Valley such as pollution, resource overuse, and waste dumps. It takes a step away from the "American dream" of owning a house with a well-manicured lawn and transforms it into a new vision where everything is within walking distance in your community and with a well-designed street system. Through exploring multiple literature articles, data-based articles and websites, this paper will discuss the implementation of compact design and the possible pros and cons of using it in the Treasure Valley area. Compact housing addresses some challenges from increased urbanization with theoretical results such as reduced water consumption, promotes public transit, and potentially increases resource preservation. The idea of compact design matters because it provides potential solutions to some increased urbanization problems, it can reduce water usage, and create more affordable housing which brings higher urban density, which brings more customers to local stores. *Faculty Sponsor: Megan Dixon*

7:00 p.m. **Theatre Senior Showcase**

Langroise Studio Theatre

Senior Theatre majors will perform and present their work showcasing their accumulated theatre skills at C of I. Seniors include Tristan Beauchaine, David Garrison, Madison Hartwell, Alexander Sproule-Fendel, and Jeanna Vickery. There is no cost for admission.

INDEX OF STUDENT AUTHORS

	Oral Paper Session 1, Bn103		Oral Paper Session 2, Bn101	
1:20	Shand, Baker	The Effects of Digital Versus Print Platforms on Learning	Jordan	Órganos artificiales: El futuro de los trasplantes en España
1:35	Truska	Fire Flipping Floodplains: Estimating Sediment Delivery from Wildfire Blowdowns and Valleybottom Tree-throw	Cerda	¿Cómo puedo mejorar mi español?: Los efectos de estudiar en el extranjero en la adquisición de la fluidez,
1:50	Kelly	Examining Phase II Detoxification Activity in Signal Crayfish (Pacifastacus leniusculus) Antennal Gland	Tavener	Los jóvenes en riesgo: América Central y la amenaza de las pandillas
2:05	McCaw, Marcotte,	The Dara'ang and the Art of Becoming Governed	Rockefeller	Characterization of Gordonia phage Axym

break

	Oral Paper Session 3, Bn103		Oral Paper Session 4, Bn101	
2:35	Hern	Predicting pH and concentration of oxalate systems with chemometric modeling	Sorenson	The Larynx: A complex, marvelous musical instrument
2:50	Sawyer, Shand	Let's Go for a Walk: False Memories for Performed and Imagined Events on a Campus Walk	Weiss	Exploring Student Perceptions of Campus Racial Climate at the College of Idaho
3:05	Walcroft	Word List Modification in the DRM	Reed, Vieille	Measuring Coral Health in the South Water Caye Marine Reserve using the Coral Health Watch Chart
3:20	Moreno	Jurors' Perception of Eyewitness Testimony: Judgment and Accuracy of True memories, False memories, and Intentional Lies	Damele	Evaluating Measures to Maintain Water Quality During Times of Urban Expansion and Population Growth in the Treasure Valley, Idaho
3:35	Tavener	Doxorubicin Causes Dose-Dependent Cell Death in a Glioma Cell Line	Cowman	The Liberation Effect: Support for the ANC in South Africa

ZERO
CORRELATION

2019 SENIOR ART EXHIBITION

APRIL 18-MAY 18

RECEPTION APRIL 18 @4PM

BLATCHLEY- THE COLLEGE OF IDAHO