2019 AISES
National Conference

Student Abstract Booklet

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AISES Pre-College Student
Poster Research Presentations

Sponsored by:

A Comparison of Zooplankton Between Two Oʻahu FishpondsA Comparison of Zooplankton Between Two Oʻahu Fishponds

Keahe Silva
Kamehameha Schools Kapālama
Marine Biology

The purpose was to observe the different species and abundance of zooplankton that come into two Oʻahu fishponds. Heʻeia Fishpond and Waikalua Loko were the sites used to obtain the samples and take measurements of each mākāhā (sluice gate). Plankton nets were deployed on three of the mākāhās to gather plankton. The samples taken were preserved in 14% formaldehyde and stored in a refrigerator until needed. One pipette was then used to take water from a sample and drop it onto a gridded petri dish. Repeated for all of the samples. Three hypotheses were made, 1) Heʻeia Fishpond will have a larger richness of zooplankton coming into the pond because the pond is more productive. 2) Heʻeia Fishpond will have more incoming zooplankton than Waikalua Loko because it is a more productive pond (meaning that there are more fish). 3) Copepods will be the most abundant zooplankton found at both Waikalua Loko and Heʻeia Fishpond because they are the most common zooplankton. In total there wasn't a significant difference in species richness between the two ponds. Heʻeia Fishpond had a higher species richness and amount of zooplankton coming into the pond. Overall, the most common organism was the copepod.

Presentation Type: Poster Presentation

Presenter: Keahe Silva
Tribal Affiliation:
Email: Keahe.silva@imua.ksbe.edu
Biography: Keahe Silva is a student at Kamehameha Schools.

Apache Word AppApache Word App

Maekquin Fossum
Mescalero Apache School
Technology

How can we continue to learn our Native language using technology?
The purpose of creating the android app for Apache Language was to help to preserve it for the future of our tribe. We also were thinking of having it as an additional learning resource for other students in our school. Steps of creating the app included learning how to use Android studio, making layouts with XML programming language, making app working with java programming language, learning how to use sound recording software, learning how to use android phone in "developer" mode and uploading our app to phones, ios file system to move files around. First, we decided on how our app is going look like. Second, we founded out how achieve the look of the app with XML. We studied the designing requirements for launching icon and combined it with our intent to make it meaningful for people of our tribe. To obtain our data, we worked closely with elder of our tribe to record for the Apache words. Our plan is to continue on working on our Language App and add many more word categories. We are proud of our culture and our language!

Presentation Type: Poster Presentation

Presenter: Maekquin Fossum
Tribal Affiliation: Mescalero Apache
Email: maekquinf@gmail.com
Biography: Maekquin is a Freshman at the Mescalero Apache School. He enjoys playing Basketball,cross-country,track,he is a member of the Mescalero Apache STEM program,and he is a member of knowledge bowl.When Maekquin graduates from high school he wants to go to college and he wants to take classes on physical therapy to become a physical trainer.

Blind Aid For The ElderlyBlind Aid For The Elderly

Alyssa Blake
Mescalero Apache School
Medical Aid

Native American elders have many of the same needs as other elder populations; however services to address these needs remain unavailable, underdeveloped or inaccessible in most Native American communities. We want to develop a device to aid the elderly with their impaired vision. In our community, many of our elders have diabetes which causes blindness. It may not be bad at first but as they age its worsens.
The device we are building a case that will hold an ultrasonic sensor and a servo. Ultrasonic's readings are scaled to a servo. The user can tell how far away something is by pointing the device towards something and feeling the servo. The greater the angle the greater the distance.

Presentation Type: Poster Presentation

Presenter: Alyssa Blake
Tribal Affiliation: Mescalero Apache
Email: alyssablake6x3@gmail.com
Biography: Alyssa is currently in the tenth grade at Mescalero Apache High School. She is a member of the Mescalero School's AISES program. This will be her first year being part of the Mescalero STEM program. She wants to go to college and major in a STEM career such as engineering. Alyssa has a 3.5 gpa.
She enjoys outings with her family and friends.

Brick That Trash!Brick That Trash!

Alesia Nez
Navajo Preparatory School
Environmental Science

This experiment was conducted to benefit the world's population by proposing an alternative method to the disposal of Styrofoam™ and cardboard. It is also to advocate for changes in the lives of the people to ensure a sustainable and healthy future. The purpose of this research is to find out which brick composition will produce the best strength-to-weight ratio. If equal amounts of Styrofoam™ and cardboard were added, the brick will have the highest strength-to weight ratio. Each brick had different amounts of Styrofoam™ and cardboard, some contained both. Styrofoam™ and cardboard were collected throughout the school and then used to create bricks with different amounts of Styrofoam™ and cardboard. Then the researcher let the bricks get tested for their durability. In the data collected, Brick 10 (mix of both) had the highest strength-to-weight ratio of 115.9, with the equal amounts of 5% Styrofoam™ and 5% cardboard.

Presentation Type: Poster Presentation

Presenter: Alesia Nez
Tribal Affiliation: Navajo
Email: neza1@navajoprep.com
Biography: Alesia is from New Mexico living on the Navajo Reservation with her family. And she is currently a senior attending Navajo Preparatory School in Farmington, New Mexico. Alesia finds interest with environmental science and with astronomy. She's also quick at learning from new experiences in any science field.

Buffalo Collagen Vs. Beef Collagen: Comparison and AnalysisBuffalo Collagen Vs. Beef Collagen: Comparison and Analysis

Beau DuBray
Timber Lake High School
Biochemistry

The purpose of this study was to determine if buffalo have a greater ratio of collagen to bone than cows - supporting the non-existent buffalo-derived supplement as a better choice. To test this, femurs were obtained, cleaned, and sliced from deceased buffalo, cows, and one chicken. The bone marrow was removed from two samples of each bovine animal. All slices were massed, put into acetic acid, dried, and then massed again. The liquid was filtered to collect extracted collagen. A graph of the percentage for collagen yield showed the yearling buffalo's bone-without-marrow had the greatest percentage: 1.05% compared to the yearling cow's 0.18%. A graph of the collagen as a percentage of bone that underwent a reaction showed the yearling buffalo bone-without-marrow had the greatest percentage: 13.34% compared to the yearling cow's 3.34%. The percentages increased slightly with age in cows. In both graphs, the samples without marrow had greater percentages in buffalo than those with marrow and the opposite was found for cows, though the differences were much less. Extracted collagen percentages decreased with age in buffalo. Overall, the younger buffalo had greater extraction ratios, especially for samples without marrow, but the cows' were more consistent with age.

Presentation Type: Poster Presentation

Presenter: Beau DuBray
Tribal Affiliation: Cheyenne River Sioux Tribe/MHA Nation
Email: beaudubray@gmail.com
Biography: Beau DuBray is a member of the Cheyenne River Sioux Tribe. He lives on a buffalo ranch and is currently attending high school in Timber Lake. Beau has primary interest in the Lakota culture and liberal arts, but recognizes the importance of STEM and especially its importance to Indigenous people. He hopes to further his education beyond high school and gain perspective while roaming the earth.

Clay-Dyed Wool for Natural Sun Blocking FabricClay-Dyed Wool for Natural Sun Blocking Fabric

Miauaxochitl Haskie
Navajo Preparatory School
Physics

The sun's ultraviolet radiation has become a very dangerous threat to human skin causing cancers which can include deadly melanoma. Research has shown that clay is a natural sunscreen. By creating a sun blocking fabric with clay-dyed wool, the risks of skin cancer may be decreased.
Wool was dyed with mordant; then, with a mixture of each clay (red, bentonite, and kaolin) and soy milk. The clay-dyed wool and undyed wool (the control) was then knit each into fabric and the amount of UVB rays passing through each was measured. The UVB of direct sunlight was measured using Oxford ED-2000 X-Ray Fluorescence and Hitachi S-4700 FE-SEM on each material used. Metal oxides common to each clay that made the fabric sun blocking (Al_2O_3, SiO_2, Fe_2O_3, and TiO_2) were discovered.

Presentation Type: Poster Presentation

Presenter: Miauaxochitl Haskie
Tribal Affiliation: Navajo
Email: miahaskie@gmail.com
Biography: Navajo Preparatory School student.

Developing a Hydropower Generator for Fishpond MākāhāDeveloping a Hydropower Generator for Fishpond Mākāhā

Joshua Parker
Kamehameha Schools Kapalama
Alternative Energy

Loko Iʻa, or Hawaiian fishponds, are unique aquaculture systems that consist of mākāhā, or sluice gates. The tidal currents which pass through mākāhā produce a large amount of energy, leading to the question if such sustainable energy can provide electricity for fishponds and nearby houses. The purpose of quantifying the flow rate in mākāhā was to determine the most suitable location for a hydropower generator. The rate of water-flow was the best indicator of the amount of energy a mākāhā produces. The Heʻeia mākāhā had a much better flow rate than those at Waikalua Loko Iʻa; therefore the generator should be deployed in Heʻeia. The purpose of determining the RPM of propellers in mākāhā was to discover what blade design spins the best and converts the water-flow energy into electricity the most efficiently on a generator. The smallest, fan-shaped blade had the highest RPM. The purpose of calculating the generated voltages of hydropower generator prototypes was to determine if electricity can be produced from a prototype, and which prototype most efficiently converts water-flow energy into electricity. A hydropower generator could convert the water energy in a mākāhā into electricity. Prototype 2's generator most efficiently converted water-flow energy into electricity.

Presentation Type: Poster Presentation

Presenter: Joshua Parker
Tribal Affiliation:
Email: joshua.parker@imua.ksbe.edu
Biography: Joshua Parker is going to be a junior at Kamehameha Schools Kapālama for the 2019-2020 school year. Joshua began his science research project, "Developing a Hydropower Generator in Fishpond Mākāhā," his sophomore year; competing at the Pacific Symposium for Science and Sustainability (PS3), Kamehameha Schools Kapālama Science Fair, Oʻahu District Science Fair, and attending the AISES Leadership Summit in Cherokee for advancing to phase 2 of its energy challenge. He currently volunteers and researches at both Waikalua and Heʻeia fishpond. Aside from working on his science project, Joshua is involved in various sports and clubs at his school. He was the captain of the JV basketball team for both his freshman and sophomore year. This year, he was selected to compete on the varsity team after his JV season. Pole vaulting is Joshua's primary sport, as he won 3rd place in the state as a sophomore. He is also in the PSAT Team and National Honors Society. Joshua hopes to become an engineer who works alongside the Hawaiian people to help to address present and future problems in Hawaiʻi.

Health and environment awareness- a Health Science SurveyHealth and environment awareness- a Health Science Survey

Kaarthik Anand
Bellaire High School
Health Science

Health is a right. Knowledge, awareness, and accountability are essential. Health status depends on individual behavior, social construct, and policy and regulations. Healthy equity is a challenge. We issued a survey (anonymous) to the family units. The study included questions on health maintenance, drinking water use, water contamination, physical and environmental factors affecting health. Adult and children made doctor visits for both sick and check-up visits 71% and 90%, respectively. Mainly older children did not sleep adequately. Knowledge of fluoride and lead is reasonable. Soda consumption (<5/week) for cans was 27% while bottles were 13%. Most of them preferred both tap and bottled water for drinking. Awareness of neighborhood score, crime score, and walk score was inadequate. Similarly, pollen, UV, and Air quality index were perceived differently. The study population is health conscious. Habits, such as drinking water and soda consumption, need improvement. Further research survey on target population can identify knowledge gaps and assess needs in the community.

Presentation Type: Poster Presentation

Presenter: Kaarthik Anand
Tribal Affiliation:
Email: kaarthik.anand@gmail.com
Biography: Kaarthik Anand is a student member of AISES since 2019. He will be a senior high student who has an interest in science and health. He enjoys playing baseball and volunteers in helping disabled children.

Indigenizing Mental Health Treatment: An Examination of Indigenous Understandings of the Causes and Treatments of Mental Health DisordersIndigenizing Mental Health Treatment: An Examination of Indigenous Understandings of the Causes and Treatments of Mental Health Disorders

Hailey Lambert
East Chapel Hill High School
Health, Psychology, Medicine

European colonization has affected nearly all aspects of American Indian life, greatly transforming, among other things, methods of conceptualizing and treating mental illness. In order to help indigenize the future of health care, we researched ideas about mental illness prior to the European colonization of the Americas, specifically during the Classical and Post-Classical Periods (600 BCE to 1450 CE). Using library research and historical analysis, we gathered, synthesized, and condensed information about pre-contact ideas and treatments of mental health. First, we found that early European ideas linked mental illness and Christianity, which fostered blame and shame about mental illness that persists today in our communities. Indigenizing health care would move away from these toxic ideas. Second, from the sparse amount of scholarly information about mental health in the Americas prior to colonization, we identified ideas about balance and about plant-based medications. These ideas and treatments might serve as resources for tribes to further indigenize health care.

Presentation Type: Poster Presentation

Presenter: Hailey Lambert
Tribal Affiliation: Choctaw Nation
Email: halambert@chccs.k12.nc.us
Biography: Hailey has been a student member of AISES since 2017 and is president of her high school's pre-college affiliate AISES chapter. She is a rising 11th grader at East Chapel Hill High School in Chapel Hill, North Carolina. She is an enrolled citizen of the Choctaw Nation and a registered first-descendant of the Eastern Band of Cherokee Indians.

Monitoring pH levels in our riversMonitoring pH levels in our rivers

Terryne Chee
Mescalero Apache School
Environmental

Presentation Type: Poster Presentation

Presenter: Terryne Chee
Tribal Affiliation: Mescalero Apache
Email: terrynechee05@gmail.com
Biography: Terryne is a senior that attends Mescalero Apache School. She is very involved with her culture. Stem and Robotics are some activities that she has joined. Her favorite subject in school is English. Terryne is the president of the International Honors Robotics Society and the National Science Honor Society. She is now a member of student council.

Novel Artificial Synthesis of Sugars from Non-Organic Compounds for Renewable Cellular EnergyNovel Artificial Synthesis of Sugars from Non-Organic Compounds for Renewable Cellular Energy

Sky Harper
Navajo Preparatory School
Biology, Chemistry, Cellular Energy, Biochemistry, Organic Chemistry

The purpose of this investigation was building a reactor that combined carbon dioxide and water molecules into artificially synthesized carbohydrates and identifying those carbohydrates that were produced by comparing them against known lab-grade controls. The reactor was built from high gauge wires, a 3–to-6 VDC input high-voltage-output generator, sewing needles, hypodermic needles, and a glass container. To identify the analytes from the non-biological reaction, a UNICO S2150UV spectrophotometer and K3 software were utilized. The analytes were also tested by adding Benedict's solution and iodine. The spectrophotometer gave absorbance and transmittance of the substance under different wavelengths from 195 to 400nm that was used as a guide to identifying the output of the reactor. The Benedict's test, Fehling's Test, and Barfoed's Test helped to identify any sugars that were produced, based on four lab-grade controls (glucose, sucrose, fructose, and dextrose). Crystalline sugar was also grown by evaporating the liquid from the output of the generator and compared with sugar crystals taken from lab grade controls. This is a model for future investigation into the synthesis of edible substances for exploration into space, including Mars. This investigation also modeled a possible solution for recycling excess carbon dioxide from the Earth's air.

Presentation Type: Poster Presentation

Presenter: Sky Harper
Tribal Affiliation: Navajo
Email: harpers@navajoprep.com
Biography: My name is Sky Harper and I live in Aztec, New Mexico. I am a junior in High School, and am very passionate about STEM. I have competed at the school, county, state, national, and international level, in presenting research. I also am involved with other programs that are not STEM, such as writing club, and Evolvement(a program that promotes a tobacco free New Mexico).

Predicting Single Pile Scour Depth Using Genetic Expression Programming (GEP)Predicting Single Pile Scour Depth Using Genetic Expression Programming (GEP)

Jonah Yoshida
UH Manoa / 'Iolani School
Civil and Environmental Engineering

Scour, a form of flow induced erosion, around bridge piles is estimated to be the cause of a majority of bridge failures in the United States. Knowing the equilibrium scour depth at a specific pile is important in determining severity. However, measuring equilibrium scour depth is made difficult due to turbulence or inaccessibility. GeneXProTools 5.0, a genetic expression program, was used to generate a function with five inputs (grain diameter, pile diameter, flow depth, flow velocity, and critical flow velocity) and a single output (equilibrium scour depth). Each of the thirty individuals in the algorithm's population had three genes linked by an additive function. Ten arithmetic and trigonometric operators were selected to create each gene's head, random numerical constants were included, and mutation rates were set to 'optimal'. The function was evolved to describe the general, non-linear, and complex relationships between each input variable and the output variable. After 1,705,298 generations, the optimal function fit the training set of data (n=254) and the testing set of data (n=83) with RMSE values of 0.035 and 0.031, respectively. To conclude, genetic expression programming is a viable option to solving logistic regression problems in hydraulics, engineering, and beyond.

Presentation Type: Poster Presentation

Presenter: Jonah Yoshida
Tribal Affiliation:
Email: jky2101@iolani.org
Biography: Jonah is a rising junior in high school, interested in math and computer science.

Prevention of Adoretus sinicus(Chinese Rose Beetles) Toward The Metrosideros polymorpha(`Ohi`a Lehua)Prevention of Adoretus sinicus(Chinese Rose Beetles) Toward The Metrosideros polymorpha(`Ohi`a Lehua)

Roxanne Main
Kamehameha Schools-Kapalama
Animal Science

Of special interest toward the Chinese Rose Beetles, Adoretus sinicus has been found as a secondary vector of Ceratocystis spores. Beetles were captured on `Ohi`a Lehua trees and tested to determine leaf preference. After the collection of healthy vs eaten leaves, crushed vs eaten leaves, adult vs seedling leaves, and leaf surface vs stem plant parts beetles were released in a choice chamber. This was followed with testing possible attractants which included water vs pure ethanol and pure ethanol vs eaten leaves. Results of eaten leaves showed the leaf contained a certain attractant component, testing 4 extracts of healthy vs eaten leaves with pure or absolute ethanol. Other chemicals of pure methanol and 2-Propanol were also tested against pure ethanol. To understand if beetles were attracted to a certain chemical concentration, 2-Propanol was tested against rubbing alcohol. Due to the rubbing alcohol attracting a higher beetle population in a slower time, 2 isopropyl extracts with eaten leaves were tested; which resulted with the rubbing alcohol. This was followed with possible trap designs using water bottles which contained the rubbing alcohol extract on cotton balls. Traps were placed at various distances away from infected trees to capture beetles.

Presentation Type: Poster Presentation

Presenter: Roxanne Main
Tribal Affiliation: Native Hawaiian
Email: roxanne.main@imua.ksbe.edu
Biography: Roxanne Main is a current high school student who has an interest to preserve native species. After making a 10th grade environmental speech about the worsening affects of Rapid `Ohi`a Death(ROD) from the recent Kilauea eruption, she has been motivated to find a solution to ROD. In fear of transporting the fungus, Roxanne is currently focusing on its vectors, the Chinese Rose Beetle. Through a trap design which is both effective and affordable, she hopes to attract the beetles away from the tree to prevent the fungus spread. Roxanne is excited about the opportunity to present in the American Indian Science and Engineering Society, where she is able to share her research.

Reducing Hawaii's Energy Costs with An Innovative Approach to Reversible Fuel Cells: Using Hawaii's Ocean Water and Cost Efficient MetalsReducing Hawaii's Energy Costs with An Innovative Approach to Reversible Fuel Cells: Using Hawaii's Ocean Water and Cost Efficient Metals

Anna Grondolsky
Kamehameha Schools - Kapalama
Alternative Energy

Hawaii's energy costs are the highest in the nation. Hawaii is currently using solar and wind energy to try and combat these high prices. This project improves upon these current systems by replacing the battery backup with a reversible fuel cell (RFC). This project tests both alkaline and acidic RFCs with cost-efficient metals and electrolytes. The metals used are stainless steel, copper, and silver. The electrolytes used are potassium hydroxide, magnesium sulfate, and ocean water. To test this, reversible fuel cells with potassium hydroxide, ocean water, and magnesium sulfate were created and tested with only copper, stainless steel, and silver and then them combined together. The results show that the reversible fuel cell with a silver catalyst at the cathode and the anode with magnesium sulfate as the electrolyte is the best combination because it produced the most power, 11.2 milliwatts. This was a known successful combination. The second-best combination was stainless steel with ocean water as the electrolyte, 10.8 milliwatts. This suggests that the stainless steel and ocean water is viable because it produces almost as much power as the known combination, but the stainless steel with ocean water isn't harmful to the environment and cheaper.

Presentation Type: Poster Presentation

Presenter: Anna Grondolsky
Tribal Affiliation: Native Hawaiian
Email: anna.grondolsky@imua.ksbe.edu
Biography: Anna Grondolsky is a current high school student that has a passion for scientific research. She has currently been working on hydrogen reversible fuel cells and making them more cost-efficient and eco-friendly. Alternative energy has been part of her life for the past few years now. In the fifth grade, she began testing water electrolysis to make it more efficient. Anna would replace the different electrodes, electrolytes, and applied voltages. Through this, she has been able to take it to the next step and create a reversible fuel cell. A reversible fuel cell contains both water electrolysis, the splitting of water, and the recombining of the hydrogen and oxygen gases. Anna is thrilled to be a part of the American Indian Science and Engineering Society, where she is able to showcase her research.

Reservation Water Monitoring SystemReservation Water Monitoring System

Eston Folsom
Mescalero Apache School
Biology

This project demonstrates how to build an internet connected flow meter that continuously measures a lakes flow rate and makes real-time data available to users online. The system can be deployed to remote lakes with a one-time setup, and can be left to run on its own, automatically collecting data without the need for users to be present. Multiple meters can be placed throughout a lake to collect many points of data. Measurement data is pushed to the cloud through the system's cellular network connectivity, enabled by a Soracom Global SIM card, and can be viewed online through Soracom Harvest. AWS IoT and CloudWatch services are used to send email notifications to users when the river's flow rate reaches a critical level.

Presentation Type: Poster Presentation

Presenter: Eston Folsom
Tribal Affiliation: Mescalero Apache
Email: bitingdeer02@gmail.com
Biography: Eston is a senior at Mescalero Apache School in Mescalero New Mexico. He has been a member of AISES for 2 years, he is also a member of the school STEM club and he is a Science Honor Society.
He worked with our younger students in robotic and has competed in several robotic challenges.

Sea Cucumber Extracts (Holothuria cinerascens and Holothuria impatiens' Cuvierian Tubules) Decrease Cancer Cell ViabilitySea Cucumber Extracts (Holothuria cinerascens and Holothuria impatiens' Cuvierian Tubules) Decrease Cancer Cell Viability

Kāʻeo Kekumano
Kamehameha Schools Kapālama
Biology, cancer

In traditional Chinese and Hawaiian medicine, sea cucumbers are commonly consumed to treat blood and kidney problems. The sea cucumber extracts were prepared in a methonal solvent (MeOH) and boiling deionized water. Cell viability was analyzed by cell counting via hemocytometer, Sulforhodamine B (SRB) Assay and Cyquant XTT Assay. DAPI dye was used to observe the DNA of the cells, and the Keller Kiliani test was used to identify cardiac glycosides in the extracts. Compared to the MeOH controls, the H. cinerascens and Cuvierian tubule MeOH extracts significantly inhibited the growth of HCT-116, as well as at dilutions of 50% and 30% ($p<0.05$). However, the 30% dilution of H. cinerascens MeOH and full concentration of the Cuvierian tubule MeOH extracts did not show significant growth inhibition against HEK-293 human embryonic kidney cells. Both extracts have shown to inhibit growth in HCT-116 around its G1 phase. The Keller Kiliani test confirmed the presence of cardiac glycosides within both extracts. Overall, H. cinerascens and H. impatiens' cuvierian tubules MeOH extracts, which have never been tested in cancer research before, show signs of significant cancer growth inhibition that correlate with the apoptotic inducing effects of cardiac glycosides.

Presentation Type: Poster Presentation

Presenter: Kāʻeo Kekumano
Tribal Affiliation: Native Hawaiian
Email: kaeo.kekumano@imua.ksbe.edu
Biography: Kāʻeo Kekumano is currently a senior at Kamehameha Schools Kapālama High School. He has enrolled in a multiple array of honors and AP classes and maintains a high GPA of 4.2. In addition to his academics, Kāʻeo has also been on his school's paddling team since freshman year, paddling six-man canoe in junior varsity and now in the varsity division. He enjoys finding a balance between connecting with his culture and studying hard in the realm of academia and has since met the Hawaiian language proficiency standards of Kamehameha schools and has also been accepted into his school's "Hawaiian Ensemble" class, which is the most advanced Hawaiian chant and dance class that is offered at the school. Moreover, outside of school, Kāʻeo's passion for science and observation has led him to take on his own independent research project in the beginning of his junior year on the anti-caner effects of sea cucumbers. This project was sparked by his fascination with sea cucumbers' uses in traditional Chinese and Hawaiian medicine. After months of research, his novel discoveries of a certain specie's anti-cancer properties has led him to win several awards, including placing first in the

Hawai'i State Science and Engineering Fair overall and qualifying as an International Science and Engineering Fair Finalists.

The Antibacterial and Anti-Cancer Effects of Endemic Hawaiian Hibiscus SpeciesThe Antibacterial and Anti-Cancer Effects of Endemic Hawaiian Hibiscus Species

Taylor Moniz
Kamehameha Schools Kapālama
Plant, Biology

Lāʻau lapaʻau or Hawaiian medicinal practices consists of plant-based cures for illnesses. In lāʻau lapaʻau endemic Hawaiian hibiscuses were utilized to aid in childbirth and treat pelvic and urinary pain. Hibiscus clayi (kokīʻo ʻula), Hibiscus arottianus subsp. immaculatus (aloalo), and Hibiscus brackenridgei (maʻo hau hele) flowers were made into traditionally prepared extracts. These extracts were tested against six species of bacteria, HeLa (cervical cancer) cells, LNCaP (prostate cancer) cells, HCT (colon cancer) cells, MCF-7 (breast cancer) cells, K562 (leukemia cancer) cells, RPMI (myeloma cancer) cells, and HEK (embryonic kidney) cells. Antibacterial tests were conducted using diffusion disk assays, H. brackenridgei was found to inhibit the growth of Branhamella catarrhalis and Micrococcus luteus. Anticancer testing on HeLa, LNCaP, HCT, MCF-7, K562, and RPMI cells were measured by cell counting and Sulforhodamine B (SRB) staining. H. clayi and H. immaculatus was found to inhibit the growth of HeLa cells but did not inhibit the growth of LNCaP, HCT, MCF-7, K562, and RPMI cells. H. brackenridgei did not inhibit the growth of any of the cancer cell lines tested. Hibiscus extracts were also tested against human embryonic kidney cells (HEK), all hibiscus extracts were found to be non-toxic to HEK cells.

Presentation Type: Poster Presentation

Presenter: Taylor Moniz
Tribal Affiliation:
Email: taylor.moniz@imua.ksbe.edu
Biography: Taylor Moniz has been a student at Kamehameha Schools Kapālama for the past 11 years. She has competed in science research competitions and won multiple accolades for her project “The Antibacterial and Anti-cancer Effects of Endemic Hawaiian Hibiscus Species” including winning first in the state in the category of Plant Sciences. Taylor is passionate about biomedical research and environmental sciences. She is now currently interning at the University of Pittsburgh Hillman Cancer Center. Outside of STEM, Taylor is passionate about volunteering with multiple organizations: Special Olympics, Ronald McDonald House, Hawaiian Humane Society, and Queen‘s Medical Center. She also is involved in multiple clubs: Dog and Cat Huggers, Japan Club, HOSA Future Medical Professionals, Speech and Debate Team, PSAT Team, National Honors Society, and Kids4Kids. She holds many leadership positions: president of Kids4Kids, Director of Student Engagement at Kamehameha Schools, Officer of HOSA, and Vice President of Senior Teens4Animals Council at the Hawaiian Humane Society. She looks forward to a lifelong career in biomedical research.

The Hidden Decontaminant Abilities of MyceliumThe Hidden Decontaminant Abilities of Mycelium

Anabaah Nelson
The Avery Coonley School
Environmental Science

Purpose: How do plastic, pesticide, bacterial, and chemical contaminants inhibit blue oyster and shiitake mycelium growth throughout a period of 48 hours?
Procedure: Rehydrate the lyophilized e. coli. Take the blue oyster and shiitake mycelium syringes and place three drops in the center of the agar. Cut up the plastic bag into 60 sections and place three of each in the petri dishes with the blue oyster and then with the shiitake mycelium. Put three drops of herbicide pesticide in 10 petri dishes with blue oyster and shiitake. Repeat the herbicide pesticide process, instead using the dish detergent. Lastly, use the inoculation loop tip to place the E. coli around the mycelium in 10 of the petri dishes with blue oyster and then shiitake.
Conclusion: The mycelium had grown slowly but not enough to encompass the plastics, so, in this case, my hypothesis was not confirmed or unconfirmed. The shiitake mycelium seemed unaffected by the herbicide pesticide and continued to grow, but the blue oyster growth seemed stunted. Both mycelium had held off the E. coli bacterial growth but, the shiitake had done it more efficiently. Neither mycelium had grown or been stunted by the dish detergent but seemed unaffected.

Presentation Type: Poster Presentation

Presenter: Anabaah Nelson
Tribal Affiliation: Navajo
Email: adiitsaiandanabaah@gmail.com
Biography: Anabaah Nelson is an 8th grade student at The Avery Coonley School in Downers Grove, Illinois. This spring, Anabaah participated in the Illinois Junior Academy of Sciences regional competition and was advanced to the state competition at Southern Illinois University in Carbondale, Illinois. At the state finals, Anabaah participated in the paper sessions and received a Gold Award.

The Science of Alaska Native Traditional Foods: Gathering and Preparation of Shell Fish Resources and Environmental SustainabilityThe Science of Alaska Native Traditional Foods: Gathering and Preparation of Shell Fish Resources and Environmental Sustainability

Taylor Natkong
Hydaburg High School
Traditional Foods, Gathering, Shell Fish, Resources, Environmental Sustainability

This project aims to cultivate an inclusive classroom environment for Alaska Native students through the creation of STEM lessons about Alaska Native seafoods, through the gathering, preparation, and examination of environmental sustainability of shellfish resources. The goal of the project is to provide K-12 Alaska Native Haida students with opportunities to engage STEM learning by cultivating interest in fishery management. Due to their sensitivity to environmental changes in temperature, salinity, and oxygen availability, shellfish are an ideal indicator species to assess the health of coastal marine ecosystems. The presence of shellfish in an environment is dependent on many environmental variables that can be tested and observed, to assess the health of the coastal ecosystem we conducted bioassessment experiments at key harvest sites by observing concentration and size of soft shell clams, chemical analysis of waters, and through microbial assessment. Students and their families maintain a cultural and traditional use lifestyle by “living off the land” being as such STEM instruction should be grounded in the contexts of students way of life. We will show how responsible stewardship and management practices coupled with both Traditional Knowledge and western science result in healthy and sustainable fishery resources.

Presentation Type: Poster Presentation

Presenter: Taylor Natkong
Tribal Affiliation: Hydaburg Cooperative Association
Email: taylorarlene123@gmail.com
Biography: Taylor Natkong is a student in Hydaburg High School in Hydaburg Alaska

Toxic Gases from Wood Fires in a Traditional Navajo HoganToxic Gases from Wood Fires in a Traditional Navajo Hogan

Keona Hosteen
Navajo Preparatory School
Environmental Science

Research Question: What are the carbon monoxide, carbon dioxide levels, and radon levels in a Hogan when firewood is used to cook dinner during the winter?
The purpose of this project is to identify which of the four types of firewood (pine, pinon, oak, and cedar) produce the most carbon monoxide and dioxide. First, the researcher obtained two to three regular size logs of each type of firewood. The firewood was burned and tested in the Hogan one day at a time and carbon monoxide and dioxide was collected. Relative humidity, temperature, and radon were also collected to see the relationship with other gases. The results of the study show that cedar was the worst wood to burn, based on high carbon monoxide and long radon. Oak was the second worst, also based on carbon monoxide. Pine was the best, based on lowest carbon monoxide and radon. Pinon was the second best, based on low carbon monoxide and carbon dioxide. Pine was the best, with carbon monoxide lower than both the US Health Exposure (NIOSH) permissible and recommended. The hypothesis that the four types of firewood can be ranked from best to worst is thus accepted.

Presentation Type: Poster Presentation

Presenter: Keona Hosteen
Tribal Affiliation: Navajo Nation
Email: hosteenk@navajoprep.com
Biography: Keona is a junior at Navajo Preparatory School located in Farmington, New Mexico and will be entering her senior year. She is from the Navajo Nation and is from Crownpoint, New Mexico but resides in Standing Rock, New Mexico. She identifies herself with her clans. which are Red Bottom, Red Running into the Water, Zuni, and Water Edge. She has been a member of AISES for at least 2 years now. She has been interested in the STEM field for awhile and enjoys very what STEM has to offer. She seeks to be working in the STEM field and wants to inform more Native Americans like her into STEM. She understands how hard it is today for Native Americans to earn a job that revolves around science, technology, art, engineering, and mathematics.

Vigilant Flood DeviceVigilant Flood Device

Cora Breuninger
Mescalero Apache High School
Environmental

How can we protect our reservation from the effects of forest fire flooding? To create a good impact towards our reservation we hope the development of this Vigilant Flooding device can help to generate a more accurate warning system when notifying the right personnel when and where to act during a disastrous situation. Once the Vigilant Flooding device is completed, it becomes another resource tool in the prevention of damaged tribal land do to flooding.

Presentation Type: Poster Presentation

Presenter: Cora Breuninger
Tribal Affiliation: Mescalero Apache
Email: corabreuninger123@gmail.com
Biography: Cora is currently a Junior attending Mescalero Apache High School. She is very involved in First Robotics, Vex Robotics, Science Technology Engineering Mathematics (STEM), National Science Honors Society (NSHS), National Art Honors Society (NAHS), and International Robotics Honors Society (IRHS). She hopes to continue her education after high school.

Water Quality Across ReservationsWater Quality Across Reservations

Gracie Sandquist
Timber Lake High School
Water quality

Water is the most important resource a human consumes. When the quality of water is contaminated it could possibly affect your health in harmful ways. Testing water in schools on Reservations is important because often times people don't think twice before drinking in public facilities. The purpose of this experiment was to find out what kind of water pollution, if any, is within the supply of various schools across the Indian Reservations in Northwest South Dakota. Our goal is to find if the schools we tested have harmful pollutants in them and inform the school if any pollutants are found. Only one method of testing was used, testing strips from NovaBlue that tested the pH level, iron level, copper, lead, nitrate, bromine, and fluoride in the schools water. Our hypothesis was not-supported as Fluoride was lower than water standards. Lead was the highest pollutant found in the schools water overall, while pH level of the schools was also high. The pollutants that were low were fluoride and bromine.

Presentation Type: Poster Presentation

Presenter: Gracie Sandquist
Tribal Affiliation: Standing Rock Sioux
Email: sasandquist@icloud.com
Biography: I am a senior at Timber Lake High school. I am involved in volleyball, basketball and rodeo. In my spare time, I enjoy kayaking, boating and roping.

AISES Undergraduate Student Poster Research Presentations

Sponsored by:

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2019 Sustainability Leadership Cohort- An Education Perspective

Marissa Vele
College of Menominee Nation
Sustainability, Leadership

The Sustainability Leadership Cohort (SLC), is a community for students to learn about current sustainability challenges, possible solutions for the challenges, and the contributions of indigenous and scientific ways of knowing. A partnership with the Sustainable Development Institute and the College of Menominee Nation supports high school youth to develop college and career readiness and leaderships skills. During the program I learned more about Traditional Ecological Knowledge and how to incorporate culture into curriculum. With that knowledge, I assisted students throughout the summer on various projects and activities relating to water. As students are finishing up the program, our hope is that they leave with newfound skill sets that will help mold them into the future leaders and thinkers of our community.

Presentation Type: Poster Presentation

Presenter: Marissa Vele
Tribal Affiliation:
Email: velem_0618@students.menominee.edu
Biography: Marissa is a new member to AISES this year. She is currently an Early Childhood/ Middle Education major at the College of Menominee Nation. Her expected graduation date is Spring of 2021. Marissa is currently an intern for the Sustainable Development Institute where she is working on a summer leadership program for high school youth that incorporates STEM.

A Comparison of Casino, Pharmaceutical Research Laboratory, and Dispensing Pharmacy Operations, within Indian Reservations in United States

Juan Fabian
Elizabeth City State University

A Comparison of Casino, Pharmaceutical Research Laboratory, and Dispensing Pharmacy Operations, within Indian Reservations in United States

This project attempts to better understand why most Indian nations do not operate tribally owned and managed pharmaceutical research laboratories or dispensing pharmacies thus missing out on potential opportunities for economic growth and strengthening tribal sovereignty.
The hypothesis: Tribal nations choosing to operate dispensing pharmacies or pharmacological research facilities, share similar geopolitical operational regulations with casinos, bingo halls, and other gambling entities which are uniquely specific to American Indian reservations.
A review of data focused on Indian sovereignty, Indian reservation field site visitations, identification and review of applicable operational regulations, and creating comparison tables.
Results indicate that an indigenous pharmaceutical sciences professional wanting to operate dispensing pharmacies or pharmaceutical research laboratories which:

1. Provide opportunities indigenous people, and
2. Promote economic sovereignty,

Must take two very important steps prior to beginning:

1. Understand Federal Indian Law and regulations,
2. Understand how indigenous communities can legally operate dispensing pharmacies or research laboratories on sovereign territory.

As complex as it is, tribally owned pharmaceutical manufacturing or research labs:

A. May be established by contracting companies, domestic or foreign*
B. Must follow applicable state and Federal regulations,
C. Contracting companies must meet BOTH tribal public health and FDA regulations,
D. Funding is complex

Presentation Type: Poster Presentation

Presenter: Juan Fabian
Tribal Affiliation:
Email: jpfabian739@students.ecsu.edu
Biography: Juan Pablo Fabian is a undergraduate student at Elizabeth City State that is pursuing studies in the area of pharmaceutical science research.

A Comparison of Sample Validity in North Dakota Bats

Berlin West
United Tribes Technical College
biology, genetic, bats, north dakota

Bat research in North Dakota is in its infancy, with 11 species locally and one federally listed as threatened, it is imperative that we further research with local species while leaving the least impact we can. In order to achieve this samples of bat guano, non-invasive, and wing biopsies, invasive, against each other for genetic identification. Samples were collected in four locations in a 200 mile radius from Bismarck ND through the summer months. Bats were captured using mist nets and held in a bag until a guano sample was produced, if there was no sample produced then we did not take wing biopsies. Samples were then taken to the UTTC lab and processed and sent off for sequencing. Results suggest that non-invasive samples are just as reliable as invasive.

Presentation Type: Poster Presentation

Presenter: Berlin West
Tribal Affiliation: CRST
Email: berlinwest1994@gmail.com
Biography: Berlin West is Lakota enrolled in the Cheyenne River Sioux Tribe in South Dakota, she is part of the Hunkpapa and Minicoju Band. Her Lakota name is 'Ta'Sagye Waste Win' which means 'Walks with a Beautiful Cane Woman. She is currently perusing her bachelors degree in Environmental Science and Research at United Tribes Technical College. She plans on bringing sustainability and wellness back to her reservation.

A Morphological and Behavioral Approach to Understanding the Link Between Brain State and Behavioral Responses in Mice

Odelia Ha
University of California, Los Angeles
Neuroscience, Behavior, Sensory Processing

Brain state modulates sensory responses and behavioral performance in animals. The moment-to-moment fluctuations within the waking state result in varying levels of performance during sensory detection tasks. Our lab studied the behavioral performance of mice on visual detection tasks and preliminary results indicated that optimal performance occurred when mice exhibited intermediate arousal during running. The principal aim of our current study was to see if we could reproduce these results. For this, we carried out behavioral experiments and we obtained results that confirmed our previous findings. To further contribute to a better understanding of the relationship between behavioral state of mice and neural activity, we performed whole cell recordings in a brain region involved in goal-directed behavior (M2). Preliminary results indicate that the behavioral state of animals correlates more strongly with membrane potential dynamics in some M2 cells than in others. A morphological analysis of two neurons revealed differences in the degree of dendritic branching. These results could indicate that there are two different morphologically-defined excitatory cell types in M2 with differences in state-dependent activity. A better understanding of how behavioral state impacts behavioral performance and neural activity may help clarify the variability by which the brain processes sensory information.

Presentation Type: Poster Presentation

Presenter: Odelia Ha
Tribal Affiliation:
Email: odeliah17@gmail.com
Biography: Odelia joined the AISES community in 2019. She is expected to complete her Bachelor's degree in Psychobiology at the University of California, Los Angeles in June 2021. In the summer of 2019, she worked in the McCormick Lab at the University of Oregon, where she conducted research on behavioral states and performance.

A Spatiotemporal Hybrid Variational Autoencoder for Acceleration of Molecular Dynamics Simulations

Kristy Carpenter
Massachusetts Institute of Technology
Biology, Computer Science, Machine Learning, Simulation. Computational Biology, Artificial Intelligence

Molecular Dynamics simulations are a method of examining proteins in ways often impossible in real life. However, they are computationally expensive and require a long time to obtain useful results. Our goal was to use machine learning to reduce the dimensionality of the problem and predict future protein states, effectively accelerating the simulation. We combined two variational autoencoders (VAEs), the outer one using convolutional layers, and the inner one using LSTM layers, which allowed the model to learn both spatial and temporal information. As the full model was too complex to achieve desirable performance when trained altogether, training was split into two phases: one for each VAE. Encodings from the trained convolutional VAE were fed into the LSTM-VAE. We used a 280,000-frame trajectory of Fs-peptide contact maps as our data. The model was able to encode the data into low-dimensional spaces that retained shape information. It also produced data reconstructions and predictions that were visually similar to real data. Our preliminary results indicate that this hybrid model can be incorporated into a Molecular Dynamics workflow to more efficiently explore the possible shapes of a protein.

Presentation Type: Poster Presentation

Presenter: Kristy Carpenter
Tribal Affiliation: Native Village of Afognak; Tangirnaq Native Village
Email: kristycar2016@gmail.com
Biography: Kristy is an undergraduate at the Massachusetts Institute of Technology, pursuing a B.S. in Computer Science & Molecular Biology. Her research interests include machine learning, molecular dynamics, and drug discovery. Upon graduation, she hopes to begin a PhD program and later work in computational biology research.
Kristy is from Seattle, Washington, and is of Alutiiq (Alaska Native) descent. She is a registered member of the Native Village of Afognak and Tangirnaq Native Village, and her father is a Shareholder in the Koniag Native Corporation.

Alpha-Glucosidase and its Inhibitor in Onion Plants (Allium cepa)

Muriel Friday
United Tribes Technical College
dietary supplement

According to the Disease Control and Prevention, approximately 1.25 million people in America are diagnosed with diabetes each year, while millions more are at risk for developing the disease. Native Americans have the highest rate of having the disease and these rates continue to rise. The cost of insulin and other medications used to treat diabetes continue to escalate as well. Despite the new breakthroughs and drug developments to help lower blood sugar levels, the search for a more natural and dietary treatments for diabetes is being studied and considered nationwide. My study focuses on wild onion plant, cultivated onions, and organic onions as a potential natural source of alpha-glucosidase and its inhibitor. These compounds speed up or slow down the process of glucose and carbohydrate absorption in the body during regular metabolic functions. Using a bioassay test created by Rutgers University, my results showed there was a significant difference between the wild onions, cultivated onions and organic onions for both alpha-glucosidase and its inhibitor.

Presentation Type: Poster Presentation

Presenter: Muriel Friday
Tribal Affiliation: Northern Arapaho
Email: murielgfriday@gmail.com
Biography: Muriel Friday is a Northern Arapahoe from the Arapaho Nation on the Wind River Indian Reservation in Ethete, Wyoming. Muriel is an undergraduate student working on her associate degree in the Environmental Science Department at United Tribes Technical College (UTTC) in Bismarck ND. Also Muriel has been an AISES since May 2018.

Analysis of the Total Phenolic Content of Plants and Commercial Supplements Implemented in Hawaiian Medicine

Daezon Arruda
Native Hawaiian Engineering and Science Mentorship Program (NHSEMP)/ University of Hawaii at Manoa
Chronic diseases, Phenolics, Plant natural products, Bioactive compounds

Chronic diseases, such as heart disease and cancer, are a leading cause of death. These illnesses have critical impacts on both our local and global communities. In Hawai‘i, as in many indigenous cultures, plants are routinely used medicinally. Plant-based dietary supplements are one such usage commonly employed by individuals looking to improve their health. Although it is widely accepted that plant-derived supplements have medicinal value, the bioactive compounds used in many of these products have often not been thoroughly examined. In order to assess the bioactivity of plants used in Hawaiian medicine, we quantified the total phenolic content of some commercially available plant supplements. Phenolics are a large class of plant-based compounds that function in plant communication and defense. These phytochemicals have established relevance to medicine because they often act as antioxidants and alleviate oxidative stress. Using the well-established Folin-Ciocalteu method, we identified species that had higher concentrations of total phenolics for further testing. By characterizing the bioactive compounds in these plants, we hope to discover novel, medically relevant plant natural products. In addition, we hope to advocate to those with limited access to healthcare treatments about the medicinal value of plants within their communities.

Presentation Type: Poster Presentation

Presenter: Daezon Arruda
Tribal Affiliation:
Email: daezonjk@hawaii.edu
Biography: Daezon Arruda was born and raised on the Big Island of Hawaii. She is currently a sophomore at the University of Hawaii at Manoa, majoring in Biology. As a STEM student in the Native Hawaiian Science and Engineering Mentorship Program (NHSEMP), she is interested in research that can be beneficial in medicinal applications.

Angles of Arrival Estimation in 5G Wireless Communications Using Deep Learning

Shanen Heu
University of Hawaii at Manoa
Wireless Communications

Angle-of-arrival (AoA) estimation has been one of the fundamental building blocks of wireless communication systems. The most popular AoA estimation techniques are based on signal processing algorithms such as MUltiple SIgnal Classification (MUSIC). As the wireless systems become increasingly complicated (e.g., massive multiple-input multiple-output (MIMO) with non-traditional layout of antenna arrays, massive amounts of devices), the assumptions required by traditional signal processing algorithms may no longer hold true. In this project, we adopted a supervised learning approach and trained deep neural networks as AoA estimators by searching the architecture space of neural networks. Then, we find efficient network architectures for the AoA estimation problem. The way we do this is by using neural networks for AoA
estimation. We restrict to networks with the same number of neurons in each hidden layer. Then, we do a grid search over the depth (i.e., how many hidden layers) and the width (i.e., how many neurons in each hidden layer) of the networks.
We then find the network architecture that results in the lowest estimation
error.

Presentation Type: Poster Presentation

Presenter: Shanen Heu
Tribal Affiliation:
Email: shanenh@hawaii.edu
Biography: I am an electrical engineering major at the University of Hawaii at Manoa and currently a Junior. I love the outdoors and spending time with friends and family. In my free time I like to go to the beach, hike, basketball, or laying on a hammock in a park. I believe that a good engineer is one who keeps the safety and well-being of people in mind while trying to better those lives to the best of my abilities. I also know that establishing connections is important so making as much connections as possible will only benefit everyone greatly. The more we come together with our thoughts and ideas, the more people will be able to advance as a race.

Aqueous Multi-Phase Systems

Dominique Pablito
University of Utah
Medical Science

Rural areas of the world are deprived of standard healthcare which can render curable diseases or infections, a death sentence. The George Whitesides' lab at Harvard University sought to change this by creating a low-cost testing mechanism for common bacterial infections such as Staphylococcus aureus and Escherichia coli. We began by testing the biocompatibility of the bacteria with multiple polymers and surfactants. Then, we combined the polymers/surfactants to create an aqueous multiphase system which separated upon centrifugation. These phases separated by density and allowed us to pinpoint the exact phase where the bacteria should be located, if an infection is present in the patient sample. This testing method can be utilized on Native American reservations by creating an affordable testing method to offer patients at local clinics, rather than sending them to a hospital located hours away by car.

Presentation Type: Poster Presentation

Presenter: Dominique Pablito
Tribal Affiliation: Zuni, Navajo, Comanche
Email: dominiquepablito@gmail.com
Biography: Dominique is a senior at the University of Utah majoring in Chemistry. She started college at the age of 15 and is currently 19 years old. She strives to mentor Native American students seeking higher education in STEM and has been a motivational speaker at multiple Native American high school conferences. Dominique has been a part of the Bhaskara Lab at the Huntsman Cancer Institute for 2.5 years, and she has done two summer research internships at Harvard University. She hopes to enroll in an MD-PhD at a prestigious institution so that she can return home to the reservation to mentor the next generation of indigenous scholars. Dominique is a part of the Zuni, Navajo, and Comanche tribes.

Azolla

Taylor Yazzie
New Mexico Institute of Mining and Technology
Biology

The Purpose of this investigation is to find out whether or not the current recent Azolla fern could possibly reverse the effects of climate change.
The light levels affect the photosynthetic rate of Azolla becasue the plant requires light in order to produce glucose as a food source.
To accomplish this I conducted an experiment where I measure the production of glucose before the Azolla was exposed to light and then after when it was dried out. I left the Azolla in the light for 48 hours and let it dry for 72 hours in order to make sure the readings were accurate. I then was able to take the initial biomass and divide that my the resulting biomass to get a percentage of how much glucose was produced from the experiment. My results were the second darkest tint was the one that had produced the most glucose within the plant. This indicates that Azolla should be grown in a shaded area in order for it to produce the most glucose. Utilizing this information it will help the scientific community find under what conditions is optimal to grow Azolla like it was used in the past to reverse climate change.

Presentation Type: Poster Presentation

Presenter: Taylor Yazzie
Tribal Affiliation: Pueblo of Laguna
Email: tcyazzie@yahoo.com
Biography: I am a Undergraduate Student studying Environmental Science at New Mexico Tech. I have been an AISES Member for three ongoing years now. I have presented last year my previous science fair project about dying your hair. I enjoy attending the AISES Conferences due to the fact that I learn a lot and I get to interact with professionals who have the same interests as my self or have similar interests.

Cercis Canadensis (redbud) Seed Nutritional Components

Lexus Thomas
Southeastern Oklahoma State University
Biochemistry

Early explorers reported that Native Americans roasted immature redbud seeds before consumption. Many legumes seeds are toxic if eaten raw, so initially we assumed that seeds were cooked because of either toxicity or side effects. We therefore compared the development of pupae of wingless Drosophila melanogaster (fruit flies) consuming raw redbud seed paste versus boiled redbud seed paste, when mixed with standard basal diet. The pupae results were more surprising than expected. Our control diet and boiled seed paste groups had about the same number of pupae deposited on the walls, while our raw seed paste group showed no pupae deposited on the walls. However, we later found many adult flies in these tubes, so flies were still producing viable offspring, but could not climb and deposit pupae on the walls. We used SDS-PAGE to analyze protein profiles of younger seeds versus more mature seeds. Gels showed that more mature redbud seeds contained more protein. Four clear bands accumulated which are possible seed storage proteins. In future studies we will test fully mature redbud seeds in the fly experiments and attempt to purify and sequence major protein bands. Research was supported by OK-INBRE SMaRT intern program, NIH-NIGMS award P20GM103447.

Presentation Type: Poster Presentation

Presenter: Lexus Thomas
Tribal Affiliation: Choctaw
Email: lthomas32@student.s.edu
Biography: My name is Lexus Thomas, I am from Kingston, Oklahoma. I am a junior at Southeastern Oklahoma State University, I am a going for a double major in Biology and Chemistry. I want to apply for medical school in the future, or masters programs for genetic counseling.

Choreografish – A VR Game Exploring Anxiety Reduction in Young Adults on the Autism Spectrum

Taylor Russell
University of Utah
autism, autism spectrum disorder, virtual reality, anxiety

This research is to explore if a virtual reality (VR) game called Choreografish, developed with students with autism spectrum disorder (ASD), can potentially decrease anxiety in young adults with ASD. Studies show that individuals with ASD tend to have heightened visual thinking and learning, which is why VR gaming may be useful as a therapeutic tool. A general anxiety assessment was taken before the first VR session and was used to obtain a baseline anxiety score. A pre-assessment was taken immediately before playing the VR game, and the last after playing Choreografish for ten minutes, using a four-point scale for responses to calculate scores. Data shows a trend in decreasing anxiety among the majority of participants after playing Choreografish, and 71% of participants reported feeling calmer after. The results suggest that VR has the potential for anxiety reduction due to its controlled environment, soothing color scheme, and predictable patterns. Individuals with ASD have learning differences not yet understood, and because of this, there are limited tools and techniques available directly tailored to meet their needs. With the development of this new VR technology, people with ASD may be able to reduce their level of anxiety in a fun, enjoyable way.

Presentation Type: Poster Presentation

Presenter: Taylor Russell
Tribal Affiliation: Navajo
Email: taylorrose5410@gmail.com
Biography: Taylor Russell is an enrolled member of the Navajo Nation from the Four Corners area of New Mexico. Taylor is currently a fifth year student studying biology at the University of Utah with a minor in chemistry. She plans to graduate in the spring of 2020 then continue to medical school to become a pediatrician. As a future pediatrician, her mission is to promote health awareness and the importance of maintaining a healthy lifestyle by implementing educational health programs in addition to providing quality health care in hopes to service the lives of young Native American children.

Cloud Computing: Network Security Threats and Countermeasures.Why isn't cybersecurity practiced on the Navajo Nation?

Nylana Murphy
Navajo Technical University
Information Technology, Computer science

Keeping companies safe from attackers is no longer just a technical issue of having the right defensive technologies in place. To me, this is practicing IT security, which is still needed but doesn't address what happens after the attackers infiltrate your organization and they will, despite your best efforts to keep them out. I'm trying to draw attention to this topic to get security teams, businesses executives and corporate boards to realize that IT security will not help them once attackers infiltrate a target. Once this happens, cybersecurity is required. The question is why isn't it practiced on the Navajo Reservation? Tribal offices and small Navajo business are at risk for data breach and cyber intrusion. Studying closely with two Navajo entities I've conduced data concerning the lack of cybersecurity to our tribal offices and native business. An important role that is over looked.

Presentation Type: Poster Presentation

Presenter: Nylana Murphy
Tribal Affiliation: Navajo
Email: nylana.murphy@student.navajotech.edu
Biography: A senior level Information Technology student, studying at Navajo Technical University.

Computational Approaches to Elucidating Cancer Metabolism Remodeling

Claudia Charles
University of Utah
Cancer Metabolism

In cancer metabolism, malignant cells arise from an array of mutational changes to the cells' genetic make-up. Most often, the most mutated genes are those within the regulator, in turn manipulating a cell's metabolism. Cancer metabolism is a complex system, and as such, a more systematic understanding of this reprogramming's effect on tumorigenicity is lacking. By developing and utilizing computational approaches in cancer metabolism, we can further understand which enzymes, metabolite transporters, kinases, transcription factors, etc. are associated with each other and how these relationships change between normal and cancerous tissue on a patient-to-patient or population basis. Through data consortia like The Cancer Genome Atlas (TCGA) program and Genotype Tissue Expression (GTEX), we determined key up- and down-regulated genes related to the tricarboxylic acid cycle (TCA) in colorectal, liver, and prostate cancers. Noticing that alpha-ketoglutarate dehydrogenase is down-regulated in two of the three cancers described, we investigated the variability of genes related to glutamine/glutamate homeostasis between these cancers and their impact on patient survival. By understanding the differential mechanisms cancer cells utilize to alter a cell's usage of nutrients, new possibilities for more preventative or personalized therapeutic methods might become available.

Presentation Type: Poster Presentation

Presenter: Claudia Charles
Tribal Affiliation: Navajo
Email: claudie_1996@yahoo.com
Biography: Ya'ateeh my name is Claudia Charles and I was born on the Navajo Nation in Shiprock, New Mexico, and I am from the town Kirtland, New Mexico. I graduated from Utah Valley University with a Bachelor of Science in Biology. My Navajo clans are Maii'deezhgizhni (Coyote Pass Clan), Tabaaha (Water's Edge Clan), Hooghan Łaní (Many Hogans Clan), and Naakai Diné (Mexican Clan).

Creative Drive

Kordell Schrock
Iowa State University
Computer Science

Creativity, whether undertaken for pragmatic or playful goals, plays a key role in societal advancement as well as personal well-being. Motivated by the hypothesis that activities involving defocused attentional states such as walking, showering, eating, and driving boost divergent creative thinking and idea generation, this research is aimed at better understanding how technology can foster creativity in everyday life, for instance as part of a daily commute. Conducting user-centered design activities and undertaking simulator-based experiments, we explore how a series of interactive in-car systems (e.g., conversational agents, haptic feedback, and ambient media such as light and sound) can engage with drivers and passengers to guide creative activities and elicit novel ideas, in an effective, enjoyable, and safe manner.

Presentation Type: Poster Presentation

Presenter: Kordell Schrock
Tribal Affiliation: Meskwaki Nation (Sac & Fox Tribe of the Mississippi in Iowa)
Email: kschrock@iastate.edu
Biography: Kordell Schrock is a rising junior at Iowa State University studying Computer Engineering and aims to make an impact on Native American Communities. After spending countless hours on computer courses, Kordell knows his future entrepreneurial ideas and how to implement them.
Kordell has landed an undergraduate fellowship at Stanford University. While at Stanford University, he has conducted research with Creative Drive. This project is how to create new technology for cars to enhance creativity within the car at Stanford's Computer Science Department. In previous summers he has worked for Meskwaki Casino and interned at Big River Trading Co. He also has recently received many awards that are contributing to his education. In addition, with his Computer Engineering major, he also holds a minor in Business.

Decreased Expression of Schlafen 12 in Arsenic and Cadmium-induced urothelial cancer.

Brent Voels
Cankdeska Cikana Community College
Biology

The Schlafen family of proteins consists of short, intermediate, and long isoforms of structurally related proteins. Schalfen 12 (SLFN12) is an intermediate length member (67 kDa) expressed in human tissues with no known function. Overexpression of SLFN12 has been previously associated with increased expression of dipeptidyl-peptidase 4, E-cadherin expression, and epithelial differentiation in prostate cell lines. UROtsa cells are an immortalized but non-tumorigenic model of human urothelium, and can be malignantly transformed by both cadmium (Cd2+) and arsenite (As3+). This study investigated the expression of SLFN12 in UROtsa cells transformed by As3+ or Cd2+, and in common tumorigenic bladder epithelial cell lines: RT4, HT 1197, HT 1376, T24/83, and UM-UC-3. Data indicates that the expression of SLFN12 is significantly reduced in cells malignantly transformed by As3+ or Cd2+, and in tumorigenic epithelial bladder cells. SLFN12 may regulate the differentiation of bladder urothelial cells, while its lack of expression may indicate a more aggressive tumor type and poor prognosis.

Presentation Type: Poster Presentation

Presenter: Brent Voels
Tribal Affiliation:
Email: brent.voels@littlehoop.edu
Biography: Science instructor and undergraduate research mentor.

Designing a Virtual Reality Visualization of Hawaiian Geographical Elements

Jolie Ching
University of Hawaii at Manoa
Computer Science, Digital Humanities, Virtual Reality, Data Visualization

Maps are vehicles of geographical communication and reveal much about the relationship between the people and their land. The method with which society develops their maps is ultimately a reflection of how its people view the world around them. This project seeks to address the following questions in relation to Kanaka (Hawaiian) cartography through the development of a virtual reality visualization of Moloka'i: 1) Kanaka cartography highlights various metaphysical traits of the landscape. How does one document and visualize the intangible? 2) Can a virtual environment accurately represent a culture that is traditionally reliant on oral stories and performance rituals? By including Kanaka geographical elements that are typically absent from current Western maps, the visualization of Moloka'i will grant users an interactive and immersive experience of the island via a Kanaka Maoli cultural-geographic lens. With this visualization, we aim to bridge digital media and Hawaiian cartographic traditions to preserve and represent indigenous place-based knowledge systems.

Presentation Type: Poster Presentation

Presenter: Jolie Ching
Tribal Affiliation:
Email: joliec@hawaii.edu
Biography: Jolie is an undergraduate pursuing a Bachelor of Science in Computer Science from the University of Hawai'i at Manoa. Her research interest lies in addressing the question of how computer science can be used to preserve Native Hawaiian culture. She is deeply involved with her university's AISES chapter as the club's treasurer. In addition, she is the web director of UHM's campus newspaper, Ka Leo O Hawai'i, and a web developer for the Native Hawaiian Science and Engineering Mentorship.

Development of a microfluidic flow cytometer: reducing excitation light noise with optical filtering

Moses Begaye
New Mexico State University
Flow Cytometry, Optimization, Photon-flux

Flow cytometers are instruments that analyze single cells and provides phenotypic, genetic, or morphological information at a very high throughput. Cytometers operate by flowing cells in a fluid suspension through the path of a focused laser beam. As cells pass through the excitation source, fluorescence is emitted and detected if the cell is labeled with fluorescent markers. In this research we present the design of a new flow cytometer that utilizes acoustics to move cells through a microfluidic channel, which eliminates problematic pressure-driven flow (hydrodynamics). Part of our design considerations are to optimize the amount of fluorescence detectable when cells are excited by the laser. Our ability to detect dimmer fluorescence is impeded by laser light scattered by cells known as background noise. We hypothesize that a unique set up of fluorescence filters will improve the overall signal-to-noise ratio. To test this hypothesis, we optimized the optical pathway using optomechanics on aluminum breadboards, and holographic notch band-rejection and band-pass filters. We evaluate signal to noise by measuring photon flux with an initial measurement of 10^24 photons/second, and measured 10^10 photons/second after the redesign. A significant reduction for this cytometer, which will be used in cancer research and other biomedical applications.

Presentation Type: Poster Presentation

Presenter: Moses Begaye
Tribal Affiliation: Navajo
Email: mosesb@nmsu.edu
Biography: Electrical engineering major from New Mexico State University. Moses completed a summer research program involving the development of a new flow cytometer.

Development of Soy-Based Insulation Foams with Fire Retardant Properties

Dione Otten
United Tribes Technical College
Bio-based Foam, Insulation Foam, Renewable Materials

Bio-based polyols can replace petroleum-based polyols for producing a wide range of polyurethane (PU) products. Bio-based polyols are derived from abundant and renewable bio-resources, however, their utilization is limited due to the complex molecular structure. This study aims to substitute the petroleum-based polyether polyols with soy-based polyols for the fabrication of rigid PU foams that have comparable or better physical properties required for thermal and structural applications. Nano-clay particles were also investigated by embedding in the fabricated foam samples to enhance fire-retardant properties. The developed soy-based foams are expected to have less toxicity as compared to commercial foams and have added value for the soybean producers.
The developed foam samples exhibited comparable thermal properties and better dimensional stability as compared to commercial foams. Also, the rate of flame spread was lower due to the addition of nano-clays.

Presentation Type: Poster Presentation

Presenter: Dione Otten
Tribal Affiliation: MHA
Email: Otten.Dione@stu.uttc.edu
Biography: Dione Otten is a member of the Three Affiliated Tribes in North Dakota and is an undergraduate student in the Pre-Engineering program at United Tribes Technical College. Dione has been an active member of AISES since August of 2018. Upon graduation, Dione plans on pursuing a degree in Software Engineering from North Dakota State University.

Does under-treated iron deficiency anemia increase the risk of postpartum blood transfusion?

Lori Begaye
University of Utah
Medicine

Transfusion is a common cause of severe maternal morbidity (SMM) and is often associated with postpartum hemorrhage. Women with anemia are more likely to receive transfusions. Iron deficiency (IDA) is the most common form of anemia, but it is unknown whether treatment improves maternal outcomes. Pre-delivery anemia affects ~15% of all deliveries. We hypothesize that undertreated IDA increases risk of transfusion-related SMM compared to treated IDA. We are conducting a retrospective cohort study of deliveries in Utah from 2015 - 2018 of Medical records of women with IDA during pregnancy and transfusion after delivery. Univariate and multivariate regression will be used to assess a transfusion and anemia relationship. Mediation analysis will be used to assess the impact of prenatal care. The cohort includes 13,034 women, of whom ~210 are predicted to have a transfusion event. Approximately 900 women are predicted to have IDA in the first trimester, and 1900 in the second. If half received treatment for IDA, we would have 80% power to detect a three-fold difference in transfusion risk. Our research will determine if treating anemia reduces transfusion risk and identify risk factors for undertreated anemia. We hope this will identify a population to reduce preventable SMM.

Presentation Type: Poster Presentation

Presenter: Lori Begaye
Tribal Affiliation: Navajo Nation
Email: U0994286@Utah.edu
Biography: Lori Begaye an enrolled member of the Navajo Nations. She grew up in southeastern UT, Graduated from San Juan High School. She is currently attending the University of Utah majoring in International Studies with an emphasis in Global Health. She is closely involved with the Inter-Tribal Students Association and American Indian Women and Ally association on campus. She's aspiring to become a Physician Scientists researching cures for diabetes.

DOMAIN REQUIREMENTS FOR THE CALCITONIN-LIKE RECEPTOR INTERACTIONS WITH RECEPTOR ACTIVITY MODIFYING PROTEINS

Lindsey Howe
Northeastern State university
Biomedical, Biology

Calcitonin receptor-like receptor (CLR) is peptide hormone-activated G protein coupled receptor that interacts with any of three receptor activity-modifying proteins (RAMP1-3) to form heterodimeric receptor complexes with distinct signaling properties. CLR has therapeutic relevance for common diseases such as, diabetes, obesity, migraines, osteoporosis, and cardiovascular disease. CLR and the RAMPs each have an extracellular domain (ECD). My research sought to determine whether the ECD of either protein is essential for their interaction. Understanding how CLR and RAMPs interact is a key element that will facilitate future drug design targeting these receptor complexes. I designed primers to PCR amplify DNA fragments encoding each protein lacking their ECDs. The DNA fragments were ligated into a mammalian cell expression vector to create fusion proteins with fluorescent tags. The plasmids were transiently transfected into cells and protein interaction was assessed by a native gel electrophoretic mobility shift assay using detergent solubilized lysate. I observed different patterns of interactions between CLR and the 3 RAMPs when one or both of the proteins were lacking their ECD. My data suggest that there are differences in the ECD-dependence for CLR:RAMP complexes, which may reflect different assembly mechanisms, architectures, or affinities of the various CLR and RAMP domains.

Presentation Type: Poster Presentation

Presenter: Lindsey Howe
Tribal Affiliation: Choctaw
Email: howe05@nsuok.edu
Biography: Lindsey has been a student member of AISES since 2019. She completed her first bachelors degree in Secondary Science Education from The University of Oklahoma in 2016 then taught Biology and Anatomy Physiology at an inner-city Oklahoma City Public School. Lindsey returned to college at Northeastern State University in Broken Arrow, Oklahoma to further her education, working toward a bachelors of science in Cellular and Molecular Biology. Lindsey hopes to start Physician Assistant school in summer of 2020 and work in the Indian Hospital in her hometown.

Effects of alcohol pre-exposure on cocaine locomotor sensitization

Tawnjerae Joe
Fort Lewis College
Cross-sensitization, locomotor, behavioral biology

Cocaine addiction is a chronic disorder characterized by compulsive use despite negative consequences and affects ~1 million people in the U.S. Cocaine use is commonly preceded by experiences with use of alcohol; in fact, ~90% of patients with cocaine use disorder have used alcohol. To understand the biological basis of this additive drug interaction, we investigated if pre-exposure to alcohol modulates cocaine locomotor sensitization (CLS), a drug-contingent learning that shares similar neurocircuitry with cocaine taking and relapse. We first tested the ability of voluntary alcohol consumption to modulate CLS. Mice were given intermittent access to 20% alcohol and water for three weeks followed by the CLS protocol that consisted of 5 daily injections of 20 mg/kg of cocaine. Results showed no difference in CLS between alcohol drinkers and alcohol naive controls. Second, we tested whether mice previously sensitized to alcohol increase their CLS response. We found that mice pre sensitized to alcohol showed a greater acute response to cocaine and a faster development of cocaine sensitization, suggesting that changes promoted by these drugs in the brain rely on similar neurocircuitry. These experiments shed light on the underlying mechanism by which prior exposure to alcohol facilitates cocaine use later in life.

Presentation Type: Poster Presentation

Presenter: Tawnjerae Joe
Tribal Affiliation: Navajo
Email: t.joe24.tj@gmail.com
Biography: Tawnjerae Joe
Fort Lewis College
Biochemistry Major
Mathematics Minor

Elucidating the Role of Integrin Beta 3 in Metastatic Melanoma Progression

Kristen Woody
University of New Mexico
Cell Biology

Melanoma is a skin cancer derived from melanocytes. 77% of patients succumb to metastatic melanoma within five years of diagnosis. BRAFV600E is a constitutively activating mutation found in numerous cancers, especially cutaneous melanoma. This mutation causes the Mitogen-Activated Protein Kinase pathway to be constitutively activated. This pathway regulates various cellular processes including cell motility, which is controlled by transmembrane receptors called integrins. Integrins are involved in nearly every step of cancer progression from a primary tumor growth to metastasis. In our research, we question the function of integrin β3 (Itgb3) in the progression of metastatic melanoma. With a strong correlation between integrin expression and metastatic phenotypes, we hypothesize that the knockout of Itgb3 will result in less metastasis, slower migration, same proliferation, and same survival. Testing our hypothesis, we use mouse-derived cell lines with the BRAFV600E mutation to monitor the role of Itgb3 in melanoma progression. Using CRISPR Cas9, we genetically ablated Itgb3 expression to measure for invasion, migration, and survival in vitro. After completing the functional assays and validation of the knockout, we will, in-vivo, observe the metastatic rates. We will transduce the cell lines with luciferase-eGFP, transplant them into mice, and monitor for metastatic spread via bioluminescence imaging.

Presentation Type: Poster Presentation

Presenter: Kristen Woody
Tribal Affiliation: Navajo
Email: kwoody@unm.edu
Biography: Kristen has recently became an AISES member this summer of 2019. She is obtaining a Bachelor's of Science in Biology at the Univeristy of New Mexico. She will be graduating in May of 2020. Kristen is interest research in cancer. She is also planning on applying to medical school within the next year.

Emergence of Alfalfa Leafcutter Bee (Megachile rotundata) Under Varying Oxygen Levels

Kimberlee Blevins
United Tribes Technical College
Biology

The migratory pollination industry is an increasingly important part of North American agricultural programs, providing pollination services by honeybees and solitary bee species. Only the honeybee surpasses the value of the Alfalfa Leaf Cutter Bee (ALCB) in pollination of field crops. U.S. producers import ALCBs from Canada due to frequent and unexplained mortality in stocks in the U.S. Shipping bees has many challenges, including limited oxygen levels within confined areas; however, developing ALCB's may be exposed to hypoxic environments while in brood cells so this concern may not be merited. Studies conducted on insects anoxia exposure typically focus on tolerance levels, as opposed to survival or emergence after successfully completing metamorphosis. As ALCBs have been found to be less tolerant to hypoxic conditions as they mature, it can be assumed that individuals exposed to lower oxygen levels during late maturation states in the brood cell will have decreased emergence than those that are exposed to ambient oxygen levels. It is hypothesized that the treatment group, consisting of those that are exposed to 10% oxygen atmosphere will have significantly different emergence rates than the control group, which is exposed to 21% atmospheric oxygen atmosphere.

Presentation Type: Poster Presentation

Presenter: Kimberlee Blevins
Tribal Affiliation: Mandan Hidatsa Arikara Nation
Email: kilee.blevins@gmail.com
Biography: Kimberlee is a member of the Mandan Hidasta Arikara Nation, and a part of the Prairie Chicken Clan; her given name is Sunlight Woman. Kimberlee is also a founding member of The United Tribes Technical College AISES chapter. During her undergraduate career she has served on student government both at a local and national level. She is currently studying Environmental Science and Research at United Tribes Technical College. While attending UTTC she obtained two Associate degrees including Pre-Engineering and Native American Studies. Kimberlee hopes to go into Environmental Law or Natural Resources for her graduate studies. .

Exploring Acylcarnitine Transport by Octn2 in Brown Adipose Tissue

Michael Gilpin
University of Wisconsin Madison
Biochemistry/Metabolisim

Mammals use brown adipose tissue to maintain body temperature. To generate heat, brown adipocytes use circulating fuels including acylcarnitines. The importer of acylcarnitines into brown adipocytes is unknown and my project in the laboratory will identify this transporter. We performed RNA-sequencing on brown adipose tissue from mice placed at room temperature and cold and observed 207 solute carrier proteins significantly changing, 91 of which increase during cold exposure. Of these 91 solute carrier proteins, only two of them have structures predicted to transport acylcarnitines: Octn1 and Octn2. Octn2 is a plasma membrane protein that transports carnitine. Mutations in Octn2 lead to low levels of carnitine uptake which causes systemic primary carnitine deficiency resulting in renal wastage and mortality due to cardiac arrest. Patients with certain Octn2 mutations are sensitive to hypothermia, although the mechanism of this cold intolerance is unknown.
My project will determine if Octn2 is able to transport acylcarnitines into brown adipocytes. I am overexpressing Octn2, knocking out Octn2 and Octn1 using CRISPR/Cas9 in brown adipocytes, and will measure acylcarnitine uptake. This project will identify the acylcarnitine transporter in brown adipocytes, and potentially determine if the Octn2 mutations cause hypothermia in patients due to impaired brown fat function.

Presentation Type: Poster Presentation

Presenter: Michael Gilpin
Tribal Affiliation: Santee Dakota Sioux
Email: mgilpin@wisc.edu
Biography: My name is Michael Gilpin, I am a Junior at the University of Wisconsin-Madison majoring in
Industrial Engineering with a certificate in American Indian Studies. I am an enrolled member of the Santee Dakota Sioux tribe of Nebraska. I grew up on the Forest County Potawatomi reservation in Northern Wisconsin where I graduated from Wabeno High School. At UW-Madison I am the Co-President of Traditional Affairs for Wunk Sheek and I work in the Simcox Laboratory conducting research.

Exploring clam garden sites, Enhancing clam habitat for optimal shellfish production

Layla Westendorf
Northwest Indian College
Inter tidal clam survey - biology

Indigenous communities have managed to maintain a sustainable environment for millennia by using an abundance of different resources and conservation techniques. For example, clam gardens represent just one of the many mariculture technologies used to improve food security. Clam gardens have been around for thousands of years. Recently we have been collecting data on how these rock walled beaches affect clam populations. Clam gardens are phenomenal structures that promote clam growth and abundance. Recently first nation's people have been observing declines in native clam populations. We are investigating the revival of the ancient practice to increase clam populations on the reservation. To determine an ideal location to implement a clam garden, we are conducting surveys along the reservation tidelands to assess beach conditions that relate too clam gardens. Based on information gained from expert knowledge holders and researchers, we are specifically looking at juvenile clam abundance and substrate composition. Currently in our second - third year surveying. Data collected on juvenile clam and substrate composition has allowed us to narrow in on a few beaches around the reservation that may provide optimal clam growth. Upon community surveys we will have input on where they believe clam gardens should be implemented.

Presentation Type: Poster Presentation

Presenter: Layla Westendorf
Tribal Affiliation: Swinomish
Email: layla13.lw@gmail.com
Biography: Hello, my name is Layla Wiblur-Westendorf and i am an enrolled member of the Swinomish Indian tribal community. I am an undergraduate at Northwest Indian college and intend to receive my bachelors in Native environmental science followed by my masters in marine biology.

Extrafloral nectaries of the Chamaecrista nictitans and its role in plant herbivory protection

Amber Guerra
Glendale Community College
Mutualisms, ant bodyguards, extrafloral nectaries, herbivory, sensitive pea plant

Mutualisms exist between two different species as a symbiotic relationship that evolves to increase survivorship of both partners. We studied the relationship between the extrafloral nectar bearing Chamaecrista nictitans and different ant species that are drawn to the nectar. The nectar secreted by the plant is a food source for the ants and in return the ants protect the plant against herbivory. Our study was conducted in a biodiverse tropical environment in Costa Rica. We observed four different ant species visiting the plant and measured the success of the protection provided by the ants. We found a direct correlation between ant visitation to the plant and the amount of herbivory experienced by the plant. These findings suggest that the mutualistic relationship between the ants and the sensitive pea plant is successful in protecting the plant against herbivory.

Presentation Type: Poster Presentation

Presenter: Amber Guerra
Tribal Affiliation:
Email: amberbettie@gmail.com
Biography: Amber resides in Phoenix, Arizona and is currently a full-time student pursuing her B.S. in Wildlife Biology. She was accepted into the OTS REU 8-week summer program at the Biological Center in Las Cruces Costa Rica, gaining Biology field research experience. Her goal is to work on wildlife management with an emphasis on predator behavioral changes in response to human and environmental impacts.

Fish species assemblage across the longitudinal gradient across neotropical streams in the Las Cruces Biological Station, Costa Rica

Ahmyia Cacapit
University of Guam
freshwater fish population, stream ecology, seining, minnowtraps

Neotropical premontane freshwater fish are vastly understudied. Since freshwater fish are sensitive and adaptive to stressors from their environment, their assemblages can illustrate the effects of climate change through careful monitoring their distributions and community composition in stream microhabitats. Fish community surveys were conducted within streams in the Las Cruces Biological Station from 1000-1400 m above sea level (masl). Twenty sites of differing habitat type (e.g., pools, riffles, and runs) were sampled using seining and overnight, baited minnow traps. Each fish captured was identified to species, and their standard length was determined. Four species of fish were discovered: Brachyraphis terrabensis, Bryconamericus terrabensis, Rhamdia laticaudi, and Trichomycterus striatus. The most common species across all habitat types were Bry. terrabensis and Bra. terrabensis (15 and 6 individuals/sampling site, respectively). Pools were found to have higher density and greater diversity of fish than riffles, and fish densities and diversity increased with stream discharge. Two species, Bry. terrabensis and T. striatus, were not previously reported occuring >940 and >660 masl, respectively. Regular and expanded monitoring of fish community composition in neotropical streams is vital to identify distribution shifts that will likely occur due to climate change related stressors.

Presentation Type: Poster Presentation

Presenter: Ahmyia Cacapit
Tribal Affiliation:
Email: ajcacapit@gmail.com
Biography: Ahmyia Cacapit is currently an undergraduate student at the University of Guam where she studies biology. Her experience includes coral research under the University of Guam's EPSCOR program. Ahmyia is currently doing research in Costa Rica under the Organization for Tropical Studies REU program where she is monitoring freshwater fish populations.

Generation of Spontaneous Epstein Barr Virus Transformed B-Lymphoblastoid Cell Lines from Normal Donors and Patients with Multiple Sclerosis.

Randall Hughes
Fort Lewis College
Epstein Barr Virus Transformed B-Lymphoblastoid, Multiple Sclerosis, immunology, neurology, B-cells

Multiple Sclerosis (MS) is a complex heterogeneous inflammatory disorder of the central nervous system (CNS) characterized by the loss of myelin sheath insulating nerve axons. MS is one of the most common non-traumatic neurological diseases affecting young adults. MS is triggered by multiple factors such as viral infection in genetic predisposed individuals. Epstein Barr Virus (EBV) is considered a strong risk factor for MS.Since EBV infects B-memory cells and epithelial cells and is latent in B-cells, it was of interest to characterize EBV-infected B cells from MS patients. Lymphoblastoid cell lines (LCLs) were generated from EBV infected peripheral blood mononuclear cells (PBMCs) from normal donors (ND) and patients with MS. Importantly, these LCLs contain the EBV associated with each individual (spontaneous proliferative-LCL). This allows us to determine if there are differences in the EBV from MS patients compared to controls and if differential immunodominant EBV antigens can be identified.

Presentation Type: Poster Presentation

Presenter: Randall Hughes
Tribal Affiliation: Oglala Lakota, Dine, Anishinaabe
Email: rjhughes1@fortlewis.edu
Biography: Randall Hughes is a student at Fort Lewis College studying Cellular and Molecular Biology. He has conducted research at the National Institutes of Health in Bethesda, Maryland. His research interests are Multiple Sclerosis and auto-immunological diseases. He plans to pursue a combined M.D. and PhD. in Immunology.

Gidinawendimin - A Cultural Pespective on how Wild Rice has Changed in the Ojibwe Community

Lakota Ironboy
Northwest Indian College
Biology

Manoomin (wild rice) have always been at the forefront of our traditions and teachings as Ojibwe people. My ancestors migrated west from their original homelands on the east coast, in search of the food that grows on water that was foretold in the Seven Fires Prophecy. In recent decades, wild rice beds have depleted to alarming levels; both environmental change and human-made causes can be to blame. Wild rice is significant to Ojibwe culture, but rising concerns have left the people uncertain of this precious grain's survival. This research applies Native science and incorporates Ojibwe methodologies, to look into the importance this grain holds to the Ojibwe people by determining what the traditional ricing area looked like generations before and community members connection to wild rice. This methodology uses the Ojibwe seven grandfather teachings, oral storytelling and interviews to understand how wild rice and the relationship to wild rice has changed in the Ojibwe community.

Presentation Type: Poster Presentation

Presenter: Lakota Ironboy
Tribal Affiliation: Grand Portage Band of Lake Superior Chippewa
Email: Lakota20jones@gmail.com
Biography: Lakota Jones has been an AISES member since 2019. She received her Associates degree in Biology from South Texas College in 2017 and is currently attending Northwest Indian College as a senior for her Bachelors of Science in Native Environmental Science.

Incentive Contrast Vs Optimal Foraging in Honey Bee Decision Making

Skylar Fletcher
Southeastern Oklahoma State University
Biology, Ecology, Entomology, Bees, Comparative Psychology, Behavioral and Physiological Responses by Bees

We compared honey bee foraging strategies based on reward and effort on an artificial flower patch. The study aimed to test if bee foraging choice is based on past experience of reward quality and effort (incentive contrast) or on energy gain over time (optimal foraging). The bees visiting a feeder with lower sucrose concentration were trained to visit the flower patch. The patch has 18 blue and 18 white Plexiglas “flowers” of 1.2”x1.2” with a central well for “nectary”. The effort to visit flowers was increased by inserting short(~5mm) or long(~20mm) pins in a pattern on the flowers. We presented low(0.5M), intermediate(1M), or high(2M) reward of 4µl sucrose solution in flowers. In experiment 1 bees began on flat flowers with 1M reward, after 35 visits switched to short stamen flowers, later to long stamen flowers (35 visits). After the long flowers in the 2nd control phase, bees were asked to choose high reward high difficulty blue flowers vs low reward low difficulty white flowers (50 visits). The Incentive Contrast Hypothesis predicts difference in choices of bees in Experiment 1 and the Optimal Foraging hypothesis predicts no difference. Results support the Incentive Contrast hypothesis.

Presentation Type: Poster Presentation

Presenter: Skylar Fletcher
Tribal Affiliation: Cherokee Nation
Email: sfletcher36@student.se.edu
Biography: My name is Skylar Fletcher, a senior in college studying Chemistry with a BioTech Focus and minoring in English and Biology.

Increasing Condenser Efficiency Using A Biphilic Surface Coating

Gabrielle May
University of Michigan
Sustainability, Sustainable Solutions, Chemical Engineering, Chemistry, Power Plants, Mechanical Engineering, Materials Science, Heat Transfer, Energy Efficiency

Around 90% of the USA's electricity comes from steam turbine power plants. Steam plants average 31% efficiency, and have significant losses within the condensation step. Improving heat transfer within the condenser by 1% could increase the overall plant efficiency by 0.2%, and save over $1 million annually in terms of losses for a 50MW steam plant. Many condensers have poor heat transfer coefficients due to filmwise condensation on interior metallic surfaces, as water films do not conduct heat well. Our team designed a solution consisting of patterned hydroxylsilane and fluorinated silane pipe coating to create dropwise condensation on metal coolant piping, which improved heat transfer from the condensed steam to the coolant pipe. Our validation test took place within a pressurized steam chamber to mimic a condenser, and we ended up improving condenser efficiency by 4.2%, which results in an overall plant efficiency gain of 0.8%, and annual savings of over $4.5 million.

Presentation Type: Poster Presentation

Presenter: Gabrielle May
Tribal Affiliation:
Email: gabrieli@umich.edu
Biography: Gabrielle May is a recent graduate from the University of Michigan College of Engineering, and works as an engineer in the Gates Corporation Innovation in Engineering Program. She is an advocate for creativity and change, especially renewable energy and sustainability within industry.

Influence of Sexual Displays on Behavior of Anolis aquaticus

Mykel Lizama
University of Guam
Anolis [Norops] aquaticus, coloration, dewlap, sexual selection, water anole

Sexual ornamentation is observed in males across taxa. These exaggerated traits are usually highly conspicuous and have costs, such as decrease in immunity, lower fertility rates and increased chances of predation. Sexual ornamentation has nevertheless evolved presumably due to the large reproductive benefits they confer. Male Anolis lizards typically bear a conspicuous sexual ornament called a dewlap, which is used during social signaling. Although dewlaps are known to correlate with fitness-relevant traits and contest success, less is known about the potential relationship of dewlap conspicuousness and behavior. We studied the water anole, Anolis aquatics, to test the hypothesis that males with larger and redder dewlaps will exhibit bolder behavior. To test this hypothesis, we measured dewlap size and color and used open field trials to quantify boldness. We discuss the relationship of dewlap conspicuousness and behavior with respect to the evolution of highly costly sexual ornamentation.

Presentation Type: Poster Presentation

Presenter: Mykel Lizama
Tribal Affiliation:
Email: mykel.lizama56@gmail.com
Biography: Mykel Lizama has been a student member of AISES since 2019. She is currently attending the University of Guam as an undergraduate of Biology, and expected graduation date is 22 December 2019. She is interested in gaining more first-hand research experience in the field and the lab. Mykel aims to be a Tropical Biologist to help with conservation efforts on the Island of Guam.

Innovation of the Cavendish bananas: Science and Technology's implication on Policy development of Endangered cultivars

Jennifer Jones
Arizona State University
Science & Technology, Biotechnology, Food Sovereignty, Policy

Proven to be a worldwide popular fruit with production resulting in approximately $14.6 billion USD in 2016, bananas double that of fresh apple's combined import and export markets (FAOSTAT 2019). The cultivar most familiar to the American consumers is the Cavendish, a seedless sterile hybrid of two diploid parents. A recent fungus, fusarium wilt TR4, has evolved in the last two decades, therefore presenting significant implications on the Cavendish banana. The dangers of TR4 alerted institutions to expand scientific research and strengthen international regulations. The research includes mitigation and prevention methods, the invention of a new cultivar, and genetic modification of Cavendish against the impending disease. The following policy analysis will focus on current institutions and their efforts in addressing scientific and technological regulations in fighting against fusarium wilt TR4 and saving the banana markets. Suggested strategies for implementing recommendations include roles and responsibilities of various stakeholders and influential innovating systems.

Presentation Type: Poster Presentation

Presenter: Jennifer Jones
Tribal Affiliation: Navajo Nation
Email: jrjone25@asu.edu
Biography: Jennifer Jones, Navajo, attended Arizona State University where she has obtained two Bachelors of Science degrees in Mechanical engineering and American Indian studies with a Certificate in Energy and Sustainability. Currently, Jennifer is worked on applications for graduate programs with a focus on science and technology policy in energy resources. Her goal is to obtain a doctorate and serve underrepresented students interested in alternative energy resources or other STEM fields. Jennifer has been an active member of AISES since 2014, participating and networking with members at the ASU chapter and Phoenix AISES professional chapter. She has served leadership positions with the ASU Chapter from 2016 - 2018. Jennifer's interests include swimming, hiking, traveling, and listening to music.
In her final semester at ASU, Jennifer enrolled in a graduate level course with ASU President, Dr. Michael Crow, and Dr. Daniel Sarewitz to gain a challenging experience discussing the development of science and technology issues. From the course, the following research topic, the endangered banana market, was presented in hopes that our food policy and sovereignty are considered at a policy level.

Inverse beta decay and coherent elastic neutrino nucleus scattering – a comparison

Maitland Bowen
University of Michigan
Physics; Neutrinos; Neutrino Physics; Nuclear Reactors; Nuclear Non-Proliferation

Many neutrino experiments involving low-energy neutrinos rely on inverse beta decay (IBD), including those studying neutrino oscillations at nuclear reactors, and for applications in reactor monitoring and the detection of neutrinos emitted from spent nuclear fuel. IBD reactions can occur only for electron antineutrinos with energy above a threshold of 1.806 MeV. Below this threshold, the signature of neutrinos is accessible via coherent elastic neutrino-nucleus scattering (CE

Presentation Type: Poster Presentation

Presenter: Maitland Bowen
Tribal Affiliation:
Email: mebowen@umich.edu
Biography: I am an undergraduate at the University of Michigan studying physics and interdisciplinary astronomy. I perform research for the Large Aperture Telescope at Simons Observatory. I was also a summer research fellow at Virginia Tech studying applied neutrino physics.

Iron-Modified Zeolites as a Permeable Reactive Barrier to Retard Metalloids

Shantal Smart
San Juan College
Contamination, Groundwater, Zeolite, Iron-Modified Zeolite, Retardation Factor

There are traces of metals and metalloid contamination in groundwater and it is both an environmental and human health hazard. Such as mine contaminated groundwater, these metalloids will migrate and transport to any nearby water systems. This project studies the presence of microbiological communities and iron-coated zeolites to enhance the remediation of sites contaminated with oxyanions, such as arsenic and selenium. The research I am doing is to study the effects of Iron-Modified Zeolites ability to retard Arsenic. The experiment involves horizontal flow test through a permeable column of zeolites at a flow rate of 0.5 mL/min. The fluid coming out of the other end was collected in 3-minute increments over several samples. During the experiment only, the Iron-Modified Zeolite was used due to previous research saying that this zeolite out of three others had a longer retardation. Results are still in the process and so a conclusion is not yet finalized but through these experiments the Iron-Modified Zeolite will succeed in having a longer retardation factor.

Presentation Type: Poster Presentation

Presenter: Shantal Smart
Tribal Affiliation: Navajo
Email: shantalsmart16@gmail.com
Biography: Shantal was born and raised in Shiprock, NM and is a first-generation college student. She is attending San Juan College and will be graduating with her Associates degree in Engineering in May 2020. While taking classes, she is also a mathematics tutor at her college. Shantal is a student member of the American Indian Science and Engineering Society (AISES) and the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) since 2015, and is the President of the SACNAS club. Shantal is conducting her summer research at New Mexico State University and is bringing first-hand experience with her.

Matcha Tea Mediates Cancer Cell Proliferation in Human Embryonic Kidney – 293 Cell Culture by Inhibiting Metabolic Pathways Necessary for Adenosine Triphosphate Production

Ann Marie Flusche
University of Tulsa
Biology, Biochemistry, Matcha, Cancer, Metabolic Pathways, ATP Production, Catechins

In recent years, Matcha tea has been considered for its potential anti-cancer properties. The exact mechanisms responsible for the tea's properties, however, are not fully understood. Therefore, the question is: How is Matcha tea inhibiting cancer cell growth and proliferation? In vitro assays in HEK-293 cell cultures have shown that Matcha suppresses ATP production by inhibiting metabolic pathways within a cell. To examine this concept, we constructed assays that would determine which pathway(s) Matcha was inhibiting. Using different types of media, we singled out specific pathways within the HEK-293 cells, titrated dilutions of the tea on the cells, and then utilized a CellTiter-Glo Luminescent Cell Viability assay to measure ATP production in the form of light. These experiments show that catechins, which comprise Matcha tea, are inhibiting amino acid metabolism and hexokinase within glycolysis. Future experiments will focus on the precise role of these catechins in ATP production inhibition. Overall, this work increases our understanding of Matcha tea's ability to fight cancer. In addition, natural products are healthier for the body than drugs and medications designed for chemotherapy which have many side effects. Therefore, if proven to kill cancer cells, Matcha tea may be able to complement current medications.

Presentation Type: Poster Presentation

Presenter: Ann Marie Flusche
Tribal Affiliation:
Email: aeflusche@gmail.com
Biography: My name is Ann Marie Flusche and I am a sophomore at the University of Tulsa. I am majoring in Biology with minors in Biomedical Engineering and Neuroscience. This year, I have been involved in two independent research labs. One of them is focused on studying Aerobiology and airborne allergens. This includes researching various pollen found within the Oklahoma atmosphere and learning to identify and count them. The other research lab I am working in investigates the biochemical basis of human diseases like cancer by performing experiments that focus on how disrupted signaling contributes to aberrant cell cycle progression and altered metabolic pathways. Over the summer, I have continued my research through three different summer programs: the Tulsa Undergraduate Research Challenge, Chemistry Summer Undergraduate Research Program, and TU-STEM UP. After college, I plan to pursue either a PHD or a MD/PHD. As of now, I have a passion for Immunology and Neuroscience and I hope to one day conduct research that focuses on a link between the two fields of study.

Opioid Vaccines Using VLPs

Andres Ramos
Northern Arizona University
Organic Chemistry, Biochemistry, and Medicine

In the United States, there is an epidemic of opioid addiction which also is highly prevalent in Native communities. We are attempting to synthesize opioid drug derivatives to create a drug vaccine for opioid addiction. Currently, we are practicing extraction of derivatives with similar chemical groups as hydrocodone and oxycodone in order to perfect our process prior to working with more costly opioids. Once practice extraction is completed, we will be sythensizing the opioid drug derivatives and linking them with Qbeta VLPs to form a potential opioid drug vaccine. This vaccine will go into trials with immunizing mice and studying if the antibodies from the vaccine inhibits the crossing of the blood-brain barrier by opioid to prevent addictive high. This research can be beneficial by assisting and possibly eliminating opioid drug addiction within American and Native American society in the future.

Presentation Type: Poster Presentation

Presenter: Andres Ramos
Tribal Affiliation: Big Valley Band of Pomo Indians
Email: andresramos7776@gmail.com
Biography: Andres is a Sequoyah member for AISES and has been a member of AISES since 2015. Currently, he is a senior studying chemistry/pre-pharmacy at Northern Arizona University with the expected graduation date of May 2020. After his undergraduate degree, he is applying to pharmacy school to be enrolled in a pharmacy program in Fall 2021. Andres desires to work for Indian Health Services to serve his tribe in pharmaceutical services.

Optic Fiber Temperature Sensing at High Temperatures Ranging from 650 [C] to 750 [C]

Alastair Luna
Fort Lewis College
Advance Sensors, Energy, High Temperature, Optical Fiber

This project examined the characteristics and performance of optical fiber temperature sensors in 650 [C], 700 [C] and 750 [C] environments. The advantages that optical fiber sensors have over thermocouples include high spatial resolution, compact size, and relatively high survivability. Setting up an array of thermocouples has drawbacks because of its relatively large size and low spatial resolution of this approach. The ODiSI-B system from Luna Innovations, Inc., was used to interrogate the optical fiber sensor and measure the frequency shifts. Experiments were conducted in a Lindberg model 55773 tube furnace, and fibers were exposed to air during heating. UW-Madison's in-house correlations were applied to the frequency shift data to calculate the temperature. Experimental findings show that fibers annealed at 800 ± 5 [C] experienced signal degradation at 750 ± 5 [C] within 24 [hrs]; fibers annealed at 700 ± 5[C] showed signal loss at 700 ± 5 [C] within 72 [hrs]; and fibers annealed at 700 ± 5 [C] and tested at 650 ± 5 [C] did not have significant signal loss for a 72 [hr] test. The narrow scope of this testing shows that signal attenuation increases with higher temperatures and high temperature gradients.

Presentation Type: Poster Presentation

Presenter: Alastair Luna
Tribal Affiliation: Navajo
Email: abluna@fortlewis.edu
Biography: Alastair has been member of AISES since 2017. He is a non-traditional student majoring in General Engineering at Fort Lewis College and will complete the engineering program in the Spring 2020. Alastair intends to attend graduate school and is open to obtaining a PhD in advance energy systems. Originally from Kayenta, Arizona, and the Navajo Nation, Alastair is excited at the prospect of helping other fellow Natives makes gains in academia and industry.

Optimizing Graphene Synthesis for Supercapacitors to Mediate Hawaii's Solar Power Overload

Jake Uyechi
University of Portland
Materials Science, Graphene, Chemistry

Graphene is a carbon material with unique properties such as high intrinsic mobility, tensile strength, heat conductivity, and more. Graphene, the next "miracle material", can be applied in dozens of fields of study. In this experiment, graphene was synthesized through four different methods. Purity, yield and cost were measured as a means to compare graphene products. The four methods were sonication, Tour Method, Modified Hummer's Method Plus, and Solvent Influence Hummer's Method. The sonication method is a physical method of synthesizing graphene, and the other three methods were chemical methods. The finished graphene samples were placed on a glass slide and dried in an oven at 60ºC. Raman spectroscopy was used to identify the unique fingerprint of the graphene samples that were created, and it was observed that graphene samples have higher amplitudes than graphite. Based on these observations, the graphene produced through Tour Method was approximately 34.98% pure and costed just 9 cents/milliliter, much cheaper than the control ($4.65/milliliter). Tour Method graphene was then used in a graphene supercapacitor with a honey dielectric to store approximately 939 mV and 0.39 mA. With improvements of solid supercapacitor materials, the graphene supercapacitor can soon replace batteries as power storage devices.

Presentation Type: Poster Presentation

Presenter: Jake Uyechi
Tribal Affiliation:
Email: uyechi23@up.edu
Biography: My name is Jake Uyechi, and I am a Native Hawaiian attending the University of Portland in the Class of 2023. I previously participated in AISES as a high school research presenter at the 2017 and 2018 conferences in Denver and Oklahoma. Though I'm still a new AISES member, I have a deep appreciation for all of the cultural practices and backgrounds of all indigenous people, as well as the future of STEM and what it has to offer the world.

Plant phenology as an indicator for climate change

Sharissa Grignon
College of Menominee Nation
Plant phenology

Research Question: Is plant phenology and indicator of climate change?
Our research team selected twelve forest plants that grow in the Menominee Forest, to observe throughout the growing season. Weekly observations are being conducted on three, one hector, forest plots where the plants are present. The pheno-stages of the forest plants seen each week are recorded and entered into a large data base. Air temperature by each plant is also being recorded. We are in year three of the research, and no conclusions are drawn at this time. The current data is being reviewed and the results of the research are inclusive at this time. We hope that once all the data is gathered, we will be able to determine if plant phenology is an indicator of climate change.

Presentation Type: Poster Presentation

Presenter: Sharissa Grignon
Tribal Affiliation: Menominee
Email: sgrignon@menominee.edu
Biography: Sharissa is a new member of AISIS this year. She is currently a Natural Resources major at the College of Menominee Nation. Her expected graduation is in the spring of 2021. She is a phenology intern at the Sustainable Development Institute.

Process Evaluation of IMPACT: CDC's Public Health Management Program in Bangladesh and Kenya

Courtney Commissiong
Nova Southeastern University
Public Health, Management, Leadership, Evaluation, Global

The Centers for Disease Control and Prevention's (CDC) program's Improving Public Health Management for Action (IMPACT) is a fellowship program that works closely with partner countries to build a workforce of public health professionals prepared to translate science into action. Graduates of the program solve critical public health challenges and serve as public health leaders in their countries and beyond. Data from the CDC IMPACT training program was examined from the program's pilot cohort: launched 2015 in Bangladesh and 2016 in Kenya. This qualitative, non-experimental evaluation was done through document review and interviews with IMPACT staff, CDC leadership, and other CDC partners. These interviews provided a deeper understanding of the strengths and challenges of implementation within IMPACT in Bangladesh and Kenya. Interviews conducted also provided insight to recommendations and improvements that could be made to improve the program for future cohorts. The results of the evaluation determined whether IMPACT was implemented as intended in the implementation guide. The findings discuss how variations from the implementation guide in the actual process affect achieving the program's goals. An examination was conducted to reveal how organizational support and resources affected implementation of the IMPACT program.

Presentation Type: Poster Presentation

Presenter: Courtney Commissiong
Tribal Affiliation:
Email: courtcommish@yahoo.com
Biography: Courtney Commissiong is a senior undergraduate student at Nova Southeastern University in Fort Lauderdale, Florida. She is a Public Health major with a passion for research and learning ways to combat global health inequities. Along with that, she minors in Management and Experiential Leadership. Following graduation, she plans to attend graduate school in fall 2020 to obtain her Masters of Public Health in Epidemiology. Courtney has a wide range of interests beyond public health including tennis, kickboxing, music, and food.

Relative Predation Risk of Two, Co-occurring, Freshwater Crabs, Allacanthos pittieri and Ptychophallus paraxanthusi

Zane Ketchen
Heritage University
Stream Ecology, Wildlife, Biology, predation,,Crabs

The family Pseudothelphusidae contains 225 species of freshwater, neotropical crabs that provide a variety of important ecological roles in stream habitats, including acting as shredders of coarse particular organic matter (e.g., leaf litter) and predators of other macroinvertebrates. The range of many pseudothelphusid crabs' overlaps, and multiple species co-occur in similar streams microhabitats; however, little is known about factors driving their distribution. We aimed to evaluate whether predation risks between two species pseduothelphusids, Allacanthos pittieri and Ptychophallus paraxanthusi, could contribute to differences in their microhabitat use. To test if there is a difference between them, we obtained crabs in baited, overnight minnow traps and hand capturing at night. Crabs were identified to species, their carapace width was measured, and 20 pairs of the two species were tethered within either a first order stream or a third order stream at the Las Cruces Biological Station in San Vito, Costa Rica. The majority of A. pittieri were captured in first order streams, 28 of 47 specimens, and P. paraxanthusi in the Rio Java. The expected results is that the more abundant crab is going to have a higher predation risk.

Presentation Type: Poster Presentation

Presenter: Zane Ketchen
Tribal Affiliation: Yakama Nation
Email: ketchenz@heritage.edu
Biography: Zane is a member of the Yakama Nation and is a senior at HU, where he is majoring in Environmental Studies. Zane chose the path of Environmental studies because he had grown up in a traditional fashion and witnessing the affects of climate change having on natural foods and resources that the family would gather. He started his educational path in 2015 with a GED then went into a BA program the very next semester. Zane has participated at AISES the past two years, and has completed three internships: Washington State University, Humboldt State University, & Organization for Tropical Studies. Which two of the internships dealt with fisheries science with the species of turtles and crabs. He is looking forward to joining the community of earth sciences as a profession post graduation of 2020. He has worked hard to get educated for himself, his family, and most importantly tribal peoples, in hopes to inspire others to seek higher education within the community.

Scintillator Calibration With A Radioactive Source.

DeAngelo Wooley
University of California, Davis
Physics, neutrinos, neutrons, scintillation

Annie is a neutron detector at Fermi national lab that focuses on understanding the rate of neutron creation after a neutrino interacts with a neutron in a water molecule. An Americium Beryllium source is a radioactive material that gives off neutrons and gammas at a set rate. When placed in a scintillator with gadolinium loaded water we can determine the capture efficiency of neutrons by the gamma rays emitted. We need to know this, because (Annie) will shoot a neutrino beam at the water in the scintillator. This interaction will cause a water molecule to split into its subatomic particles. And we want to determine how efficient the gadolinium is at capturing the neutrons. This information will be obtained when I travel to Fermi-Lab on August 28, 2019. The (AmBe) source will be placed at specific heights within the scintillator to determine neutron capture efficiency in a liquid base scintillator. The variation in heights will let us know where the highest probability of neutron detection will be at. Knowing this can give us a better insight as to why neutrinos behave the way that they do at these particular energy levels.

Presentation Type: Poster Presentation

Presenter: DeAngelo Wooley
Tribal Affiliation: Muscogee Creek Nation
Email: drwooley@ucdavis.edu
Biography: Currently my interest are studying cryptocurrency and how that might change the world. I also work on neutron capture yield in physic experiment. The most notably are (The Accelerator Neutrino Neutron Interaction Experiment) and (WatchMan). These experiments use neutrino beams to change a neutron into a proton and we use photo multiplier tubes to see how many neutrons were capture by measuring how many gamma rays were emitted.
I've also traveled twice to Fermi-Lab in Illinois to work on the (ANNIE) experiment. I helped with the clean room installation, and (PMT) stand assembly.
Coded a Monte-Carlo Simulation that determined the specific activity of Uranium-238 and Thorium-232 in the glass of the (PMT's) this helped Hamamatsu postulate how much Uranium and Thorium was inside the glass of the PMT.

Short-term continuous cultures of Gammarus sp., Tigriopus californicus, and Nannochloropsis spp.

Brittany Baker
Oakland University
Biology

My Honors College thesis addressed the following questions: 1) can stacked rectangles of corrugated plastic sheeting make suitable habitat for a continuous culture of amphipods (Gammarus sp.), 2) can a small scale semi-continuous culture of a commercial, non-viable microalgae (Nannochloropsis spp.) be reliably maintained in the laboratory for a 3-month period, and 3) can Nannochloropsis spp. be used as an alternative to laboratory-grown microalgae to feed and maintain a continuous culture of copepods (Tigriopus californicus)? Amphipods were reared in a 10-gallon aquarium, copepods were cultured in two five-gallon plastic buckets, and phytoplankton was grown in three inverted two-liter plastic bottles. These organisms are intended for use by students in a prospective fall 2019 marine biology laboratory at Oakland University. The results of my investigation established protocols for the practical maintenance of these three cultures. Amphipods were successfully maintained, and the initial population increased by more than 73% by the end of the 3-month period. I was successful in maintaining a continuous culture of copepods. Although copepod populations underwent cyclic oscillations, by maintaining two separate cultures there were always sufficient numbers available. I was also successful in developing techniques for sustainable cultures of microalgae in optimal densities over the 3-month period.

Presentation Type: Poster Presentation

Presenter: Brittany Baker
Tribal Affiliation: Sault Ste Marie Tribe of Chippewa Indians
Email: brittanybaker@oakland.edu
Biography: I am a student at Oakland University. I will graduate with my bachelor's degree in Environmental Science in December of 2019. My research interests include: predatory fish assemblages, viability of culturing organisms in the laboratory for a short-term period, and gut content analysis of organisms using molecular methods.

Sizing Small Scale Solar Renewable Energy Systems for Navajo Nation

Callie Singer
Columbia University
Alternative Energy

The landscape of the Navajo Nation consists of about 55,000 residential homes spread across 27,000 square miles of land in the Southwest United States. The Navajo Tribal Utility Authority (NTUA) reports that approximately 15,000 homes on the reservation do not have electricity due to the high costs of connecting homes located miles from utility distribution lines to the electrical grid. To allow these rural homeowners the opportunity to access electricity, NTUA and other Native owned companies have looked towards renewable energy systems to provide power for usage such as lighting and refrigeration. The goal of this study is to evaluate recent renewable deployments and provide additional considerations for PV systems that will optimize performance and improve efficiency. Three case studies are presented in different locations on Navajo Nation varying in solar resource and energy load requirements. An assessment is conducted that includes the environmental parameters of the site-specific landscape and a system performance analysis of an off-grid PV system. The differing results of each study suggests additional analysis is needed for designing small PV systems that takes a home-land-family specific approach to allow for better efficiency and more flexibility for future solar innovations to be considered for overall cost reductions.

Presentation Type: Poster Presentation

Presenter: Callie Singer
Tribal Affiliation: Navajo
Email: cls2236@columbia.edu
Biography: Callie Singer is from Albuquerque, New Mexico. She is in her undergraduate junior year at Columbia University pursuing a B.S. in Civil Engineering with a minor in Architecture. During the summer of 2019, she participated in Sandia National Laboratories' Indian Energy Program where she conducted her research on off-grid residential PV systems on Navajo Nation. Callie plans on continuing her work with renewable energy systems to allow tribal nations the opportunity to consider alternative ways of producing and distributing their own energy resource as a means of advancing energy sovereignty.

Sovereign Indian Nations Have What it Takes to Compete in Today's New Great Space Race

John Harwell
Elizabeth City State University
Space, Aerospace, Airport, Aviation, Aviation Science, Spaceport

This project was conceived by a student-professor team from the American Indian Programs Office at Elizabeth City State University, a constituent entity of the University of North Carolina system. The following hypothesis was created: sovereign Indian Nations have what it takes to compete in today's new great space race.
The methodology of this project included several basic steps. Historical and current challenges of tribal sovereignty were reviewed. Over 50 sources related to airport management were examined. Over 16 sources related to spaceport management were studied, and 4 face-to-face interviews were conducted. Over 100 airports, airfields, airstrips, and heliports with direct and indirect Indian country relations were studied. Upwards of 1,000 laws, regulations, rules, and policies were reviewed for applicability to sovereign Indian Nations and aerospace ports. The operating frameworks of existing aerospace corporations were reviewed including partnerships used to obtain current success. Additionally, 2 site visitations were completed to tribal airports potentially suitable for spaceport development.
The data collected from both field site visits and existing sources indicate that the hypothesis is correct: sovereign Indian Nations have what it takes to compete in today's new great space race.
Let our team show your tribe or tribal enterprise how!

Presentation Type: Poster Presentation

Presenter: John Harwell
Tribal Affiliation:
Email: harwell.john.a@gmail.com
Biography: John is a new member of AISES who recently joined after becoming involved with the American Indian Programs Office at Elizabeth City State University. John is of southwestern Indian ancestry. He completed his EMT certification through the State of North Carolina in 2017 and is nearing the completion of his EMT-Paramedic certification. John is currently studying for a Bachelor of Science in Aviation with a minor in Public Health at Elizabeth City State University and hopes to one day work in the experimental aerospace and health industries.

Study of Mechanical Properties and Temperature Distribution of MEMS Devices Using FEM Simulations

Kathleen Kodama
University of Hawaii at Manoa
MEMS device, FEM, thermoelectric

Renewable energy has gained increasing attention to enable sustainable energy by reducing the use of fossil fuels. Solar, wind, and hydro-power are just some of the widely known sources for renewable energy. Another promising application for renewable energy is a thermoelectric device. Thermoelectric devices convert temperature difference into electricity without involving any moving parts. In order to characterize the efficiency of a thermoelectric device, the characterization of thermal conductivity is required. To measure thermal conductivity of nano materials, a custom-designed Microelectromechanical system (MEMS) device has been microfabricated. The challenge is that during the micro-fabrication process of the MEMS device the beams may experience deformation. To design a more efficient shape for the beams, the spring constant of rectangular beams and curved beams were studied using Finite Element Method (FEM) simulations. The simulation results show that the curved beam has a higher spring constant compared to the rectangular beam, suggesting a more robust design. In addition, the temperature distribution of MEMS devices is characterized to ensure the temperature uniformity.

Presentation Type: Poster Presentation

Presenter: Kathleen Kodama
Tribal Affiliation:
Email: kmmk4@hawaii.edu
Biography: Kathleen Kodama was born and raised in Hawaii on the island of Oahu. She graduated from Kaiser High School and is currently attending the University of Hawaii at Manoa. Kathleen is pursuing her Bachelors of Science degree in Mechanical Engineering and hopes to work in the industry after she graduates. She joined AISES in the fall of 2018 and is the president for AISES for the 2019-2020 school year.

Testing Coiled Nylon Threads as Artificial Muscles for Exoskeletons

Shawn Ray
Oklahoma State University
Artificial Muscles, Exoskeletons

The popularity of robotic exoskeletons in rehabilitation has recently been on the rise. However, one of the main limitations of these robotic exoskeletons is the large weight that is put onto the user and its bulkiness. Researchers have been looking into creating lightweight artificial muscles to help reduce the weight of robotic exoskeleton systems dedicated to rehabilitation purposes, and thus and better the rehabilitation process for the patients. These artificial muscles are being created by coiling nylon string and applying heat to the coil so that it can produce a contracting force [2]. The proposed project is, first recreate these artificial muscles, and second characterize their behavior. Our study shows that it is possible to create artificial muscles by coiling nylon string, and that these muscles contract when heated. For future applications, the artificial muscles will be made using conductive nylon to use electrical stimuli instead of heat to produce a contraction force.

Presentation Type: Poster Presentation

Presenter: Shawn Ray
Tribal Affiliation: Navajo
Email: shawn.ray@okstate.edu
Biography: Shawn has been a student member of AISES since 2017 and is currently a junior at Oklahoma State University. He is currently studying Mechanical Engineering with the Pre-Med option and has plans to pursue an MD PhD program in Electrical Engineering after graduation.

The Effect of Salinity on Growth Rates of Male and Female Juvenile Blue Crab (Callinectes sapidus)

Nicole Doran
The Ohio State University
Ecology, Marine Biology, Natural Resource Management

Blue crab is a commercially important fishery and plays a significant ecological role in estuarine food webs. Previous work has contributed to our understanding of its required habitat for reproductive success, but not much is known about juvenile development or habitat use as it relates to salinity. To begin investigating intrinsic and extrinsic factors that influence development, we assessed the effect of sex and salinity, respectively, on growth rates of juvenile blue crab. Male and female crabs were reared in a controlled environment with either high (25 ppt) or low (5 ppt) salinity. Both sexes grew faster in the low salinity conditions based on percent change in body size. Additionally, an interaction between sex and salinity was observed wherein salinity impacted male growth more substantially than it did for females based on the percent change in wet weight. Understanding the role of salinity on juvenile blue crab development can provide insight to the implications changing environmental conditions resulting from climate change may have on blue crab populations and fisheries in the future.

Presentation Type: Poster Presentation

Presenter: Nicole Doran
Tribal Affiliation:
Email: nicoledoran23@gmail.com
Biography: Nicole Doran is a rising senior at the Ohio State University and is majoring in biology. She has been the president of Ohio State's AISES chapter since 2017 and is also a student associate working with American Indian and Indigenous Student Initiatives. Nicole is a Udall Scholar and is pursuing a career in natural resource management.

The Effects of the US-México Border on Bobcat (Lynx rufus) Population Genetics

Nadira Mitchell
University of Arizona
Genetics, conservation

The current US-Mexico barrier takes up one-third of the 1,954 mile length of the border, with vertical steel posts, wire fencing, and vehicle barriers placed to prevent illegal human entry from Mexico. I tested my hypothesis that there will be significant genetic difference between the Sonora, Mexico and the Arizona, US bobcat (lynx rufus) populations due to how the international barrier blocks connectivity. DNA samples came from Sonora, Mexico and southern Arizona, US. Sonora and Arizona DNA samples were genotyped using 6 microsatellite primers. PCR products were sent to the UA Genetics Core lab for DNA fragment analysis. Once the lab results came back, the samples were analyzed, and allele sizes were determined using GeneMarker. Basic genetics statistics were processed using GenAlex. The software STRUCTURE was used to investigate population structure. STRUCTURE identified that the Sonora and Arizona Bobcats are apart of one population. GenAlex supported this with an Fst value that could be interpreted as little differentiation or slightly distinct populations. This preliminary data shows that there is connectivity between the populations and that as of right now the barriers along the US-Mexico border are not deterring dispersal of bobcats.

Presentation Type: Poster Presentation

Presenter: Nadira Mitchell
Tribal Affiliation: Navajo
Email: nadira8mitchell@gmail.com
Biography: Nadira Sage Mitchell (Navajo) is a freshman studying Natural Resources-Wildlife Conservation at the University of Arizona in Tucson, AZ.She is a College of Agriculture and Life Sciences-Arizona Science, Engineering and Math Scholar (CALS ASEMS), participates in the Blue Chip Leadership Program and a Southern Arizona Science and Engineering Fair (SARSEF) Ambassador. This past summer she participated in the INSPIRE Pre-College program at George Washington University where she developed a memo and presentation about uranium contamination on the Navajo Nation.

THE GOLD KING MINE SPILL: A NAVAJO NATION SOIL AND WATER CONTAMINATION STUDY.

Kiana Toadlena
Coconino Community College
Environmental Chemistry

The Navajo Nation has potentially experienced contamination from the Gold King Mine Spill. The Gold King Mine is located in Colorado and released about 3 million gallons of Acid Mine Drainage (AMD) into the Animas River on August 5, 2015. The Animas River meets the San Juan River in Farmington, NM, which is an important water source for the Navajo people living in in the Four Corners Region. Environmental samples were collected and analyzed throughout the year after the spill to keep residents of these communities. Studies from 2016 have shown that heavy metals and metalloids such as lead and arsenic were present in the river water and sediments at natural background levels. The purpose of this study is to follow-up on the 2015/2016 sampling to determine if there had been any changes in the San Juan River sediment four years after the spill. In this project, 22 sediment samples were collected from similar locations as were collected previously and analyzed for the same contaminants. The results of this follow-on study will be reported. Future implications will include comparison of results from the beginning of the spill to today (2019) to provide longer term information to the communities.

Presentation Type: Poster Presentation

Presenter: Kiana Toadlena
Tribal Affiliation: Navajo
Email: kot23@nau.edu
Biography: Kiana Toadlena attends Coconino Community College and is majoring in Health Sciences- Fitness and Wellness. She comes from Window Rock Arizona and she is of the Navajo Tribe. Kiana is currently nineteen years old and is a first generation college student.

The Lack of Hospital Availability on Native American Reservations

Mitakamizi Liberty
University of Minnesota, Morris
Health Service availability

This report shows the comparative absence of Hospitals on Native American Reservations and Counties in the U.S. The availability of health services in impoverished communities plays a huge role in keeping these communities and their people in poverty and Identifying this troubling reality can help us find solutions.

Easily available hospital data specifically on reservations is difficult to find. In this research report GeoDa, Cast, and Microsoft Excel was used with U.S hospital data to isolate and look at hospital Data specified to reservations, perform calculations, and determine the extent to which hospitals are unavailable in reservation communities.

It was found that ,on average, there is less than ⅓ of a hospital available on reservations compared to almost 2 ⅓ hospitals available to all other counties in the U.S. The average hospital population is found to be exactly the same on and off reservations, meaning all hospitals in the U.S will, on average, expect to see the same proportion of injuries/illnesses wherein the injured/ill needs to stay at the hospital. Though there are just as many injury/illness on reservations, if not more, there are many less hospitals available on reservations to treat these people's injuries/illnesses.

Presentation Type: Poster Presentation

Presenter: Mitakamizi Liberty
Tribal Affiliation: Leech Lake Band of Ojibwe
Email: Liber107@morris.umn.edu
Biography: I'm an Ojibwe anishinaabe from the Leech Lake rez in Cass Lake, MN. I've grown up soaked in the Ojibwe culture and language. I attended the Niigaane Ojibwe Immersion school from K-6th. As a result, I am fluent in the Ojibwe language and a successful student currently attending University of Minnesota, Morris. Growing up on the rez has made me passionate about making my community healthier and safer for my family and my people.

Tissue Engineering a Biomimetic Scaffold for Urethral Regeneration

Jessica Chun
UCLA AISES
Tissue Engineering, Medicine

Tissue engineering combines cells, scaffolds, and biochemical factors in a manner capable of regenerating biological tissues and organs. Tissue engineering strategies have been envisioned as an alternative to current options for urethral replacement in conditions such as hypospadias: a common congenital anomaly of the penis where the urethra does not fully extend. Those with a proximally displaced urethral meatus, in particular, have frequent surgical complications following reconstructive procedures, resulting in high re-operation rates. The goal of this study was to evaluate urethral mechanical properties to design a biomimetic scaffold with mechanical properties for urethral tissue replacement. This was done by electrospinning selected materials together at different concentrations and mechanically testing them the same way that the native tissue was tested. The data suggested that electrospun scaffolds based on gelatin methacryloyl (GelMA) are suitable, biocompatible candidates which can mimic the mechanical properties of the native tissue. In our studies, a tubular scaffold will be fabricated, mechanically tested, and seeded with urothelial and smooth muscle cells, creating a biomimetic scaffold for urethra tissue regeneration. These tubular scaffolds may eventually aid in a more consistent and less invasive procedure for urethroplasties, eliminating the need to use an autograft for urethral reconstruction.

Presentation Type: Poster Presentation

Presenter: Jessica Chun
Tribal Affiliation: Creek
Email: jessiichun@g.ucla.edu
Biography: Jessica (Jessii) Chun has been an affiliate of AISES since her sophomore year at the University of California, Los Angeles (UCLA). She is an undergraduate bioengineering student who joined the Annabi Lab in the Chemical and Biomolecular Engineering department in October 2018. Her main focus is to develop a composite, suitable for tissue engineering a urethra. She hopes that her efforts will contribute to the healthcare industry, reducing the postoperative complications for a congenital condition called hypospadias. Jessii would eventually like to pursue a doctorate degree in translational science and continue on to become an industry leader, working with both doctors and engineers.

Trihalomethanes, Haloacetic Acid, and Trinitrotoluene, Oh My!: The US Government's Use of the Choctaw Nation as an Environmental Toxics Dumping Ground

Jessica Lambert
Princeton University
Environmental Science

Non-Indians have long been using Indian reservations as dumping grounds for environmental toxics. At the suggestion of Choctaw Chief Batton, I investigated the impact of the US Government-owned and -operated McAlester Army Ammunitions Plant (McAAP) in the Choctaw Nation on the health of the Choctaw people and homeland. Combining methods and analysis from history, anthropology, and environmental science, I consulted and analyzed a range of sources. Settler-colonial theory and historical analysis generated a framework for understanding the historical and social context of the plant. I then mined and synthesized existing scientific and other data. I found that the McAAP detonates about 4,000 pounds of explosives every day, and that tests of the air, water, and soil in the area reveal an abundance of specific, cancer-causing toxics. The McAAP ranks in the top 10% of a list of the worst facilities in the US for cancer and noncancer risk, as well as for recognized carcinogen, developmental, and reproductive toxicants. American Indians who live near the plant have a cancer rate that is almost double the national cancer rate for Indians. These findings suggest the need for an in-depth scholarly study of the environmental and other impacts of the McAAP.

Presentation Type: Poster Presentation

Presenter: Jessica Lambert
Tribal Affiliation: Choctaw Nation
Email: jnllambert@gmail.com
Biography: Jessica is an enrolled citizen of the Choctaw Nation and a registered, first-generation descendant of the Eastern Band of Cherokee Indians. She has been an AISES member since 2016. Jessica founded and served as president of the AISES pre-college affiliate chapter at East Chapel Hill High School. She is currently a sophomore at Princeton University.

Using Stochastic Simulations to Understand the Evolution of Bacterial Persistence

Sabrina de Jong
University of South Alabama
Biophysics, Bacteria, Biology, Mathematics, Modeling Population Growth Rates, Fixation Probability

It has been observed that bacterial populations, such as Escherichia coli, exhibit persistence to antibiotics, a phenomenon whereby a small fraction of cells are able to survive the antibiotic treatment by randomly switching into a slower growing phenotype. In contrast to resistant mutants, the daughters of these persister cells do not have any genetic disposition to resisting the antibiotics. Many studies have explored how stochastic switching between phenotypes in a changing environment affects the growth rate of bacteria, but little has been done to understand the fixation probability. The fixation probability tells us if the initial mutant population will survive. By modeling the population as a Moran process (a process by which the total population is fixed and a cell is taken out or "killed off" at random after a cell divides), we hope to gain insight into how bacterial persistence evolves. It might be expected that the fixation probability would be higher for faster growth rates, but we have found that the fixation probability is not always determined by the population growth rate. By understanding how bacteria grows we hope to inspire better techniques for administering antibiotic treatments.

Presentation Type: Poster Presentation

Presenter: Sabrina de Jong
Tribal Affiliation: Hoopa Valley Tribe
Email: sfh.dejong@gmail.com
Biography: Sabrina is a recent member of AISES and hopes to get more involved. She is a Physics major at the University of South Alabama where she is expected to graduate in May 2020. She has strived to encourage young Native students to become interested in STEM and hopes to inspire more to further their education.

What the HEK

Sarah Peele
University of Alaska Fairbanks
Traditional Ecological Knowledge

In an effort to address the need for culturally appropriate teaching techniques and curriculum we began documenting Haida Ecological Knowledge (HEK) to couple with STEM disciplines. This will aid to keep the traditional information from being lost with each passing elder. This project allows for the development of a catalog of HEK from the Haida community allowing us to capture historical and traditional knowledge thereby further creating culturally relevant curriculum that can be used by not only the Haida community but for anyone. Documentation was conducted by interviewing community elders and leaders. Interviews were audio-recorded and transcribed, in addition to photos of plants and animals relevant to Haida culture. The database generated is being used to create HEK - STEM curriculum. Lesson plans developed will be made publicly available using Data Nuggets, a publicly available tool that addresses curriculum changes by bringing data into the classroom.

Presentation Type: Poster Presentation

Presenter: Sarah Peele
Tribal Affiliation: Hydaburg Cooperative Association
Email: sarah.peele18@gmail.com
Biography: Sarah Peele was born in Hydaburg, Alaska, and was raised in Deltona, Florida. Her parents are Theodore Peele and Danielle Semprini. She grew up knowing about her culture but not completely emerged. Once she graduated from Deltona High School, she wanted to reconnect with her culture, so she returned to Alaska to attend the University of Alaska Fairbanks. There she is working towards a Bachelor in Biology with hopes to attend veterinary school at either Washington State or Colorado State. After achieving a doctorate degree she wants to give back to her community by providing a permanent wildlife veterinarian on her island who also provides pro bono spay, neutering and emergency services.

AISES Graduate Student
Poster Research Presentations

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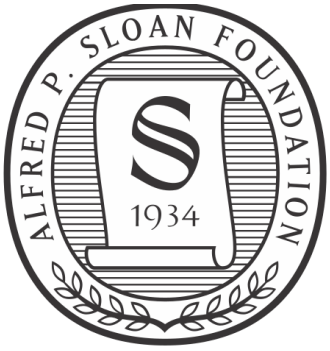

Alfred P. Sloan
FOUNDATION

3-DoF Wearable, Pneumatic Haptic Device to Deliver Normal, Shear, Vibration, and Torsion Feedback

Kyle Yoshida
Stanford University
Haptics, Human Augmentation, Robotics

Haptic devices worn on the forearm can provide communication while freeing the user's hands for manipulation tasks. We introduce a multi-modal haptic device with a rigid rotational housing and three soft fiber-constrained linear pneumatic actuators. Soft pneumatic actuators are used because of their compliance, light weight, and simplicity, while rigid components provide robust and precise control. The soft pneumatic actuators provide linear horizontal and vertical movements, and the rigid housing, affixed to a motor, provides rotational movement of the tactor. The device can produce normal, shear, vibration, and torsion skin deformation cues by combining the movement of the soft pneumatic actuators with the rotational housing. The tactor is able to provide a shear force of up to 0.47 N and a normal force of up to 1.3 N. To elucidate the physical design principle and the actuation strategy, the static force and displacement of the soft tactor are modeled as a function of material, design parameters, and pressure. The models were validated experimentally. Future work includes a user study to understand human perception and device improvements for improved wearability. The new haptic device will lead to enhanced communication, and also has potential to be used for training and augmented reality.

Presentation Type: Poster Presentation

Presenter: Kyle Yoshida
Tribal Affiliation:
Email: kyoshida@rocketmail.com
Biography: Kyle Yoshida (Native Hawaiian) received his bachelor's degree in bioengineering with a minor in African studies at Harvard University in 2018. He is currently pursuing his PhD at Stanford University in the Collaborative Haptics and Robotics in Medicine Lab, where he focuses on soft robotics research in addition to building and testing wearable haptic devices. His prior research spans biomedical imaging, biomechanics, motor control, environmental surveying, and molecular biology.

Achieving Campus Carbon Neutrality – Applying Sustainable Engineering Methods to Evaluate Technical and Ecological Solutions

Michael Charles
Ohio State University
Sustainability, Optimization, Business Management

Currently, over 300 academic institutions have committed to achieve carbon neutrality before 2100. In response, many institutions focus solely on technological options to reduce emissions, but don't properly include ecological solutions. What impacts could including nature-based solutions have on campus sustainability in pursuit of carbon neutrality? Further, how do we compare these results with the trade-offs of other technological and behavioral solutions? Optimization methods can be applied to compare the estimated carbon reductions and costs for any number of options, presenting multi-solution (technical and ecological) strategies that meet the University's needs. Understanding financial, technological, spatial, and social constraints and dynamics of the carbon reduction strategies can inform the optimization problem to assist the development of a university's action plan to achieve neutrality. Initial results show that land use change and management methods can increase carbon sequestration by 3-6 times. The results of optimization also provide a schedule and budget of solutions from now until the target date. This research discusses some of the options and challenges that exist in reaching carbon neutrality for academic institutions, while also demonstrating a potential plan for a large University.

Presentation Type: Poster Presentation

Presenter: Michael Charles
Tribal Affiliation: Navajo
Email: charles.196@osu.edu
Biography: Michael (Navajo) is currently working on his Ph.D. in chemical engineering at The Ohio State University. His research focuses on sustainable process design and explores how ecological systems can be included into technological design to expand the boundaries of traditional engineering. This research interest is a result of a continuous search for intersections between indigenous cultures and engineering. For the past seven years, he has worked with the American Indian Science and Engineering Society and has organized multiple conferences around the themes of sustainability, indigenous knowledge, and academia. Michael hopes to use his research to increase indigenous representation within sustainability research and decision-making, as well as in higher education.
Understanding limitations of academic research, Michael began working with an youth-led organization, SustainUS, and the International Indigenous Peoples' Forum on Climate Change (IIPFCC). Michael was a delegate to the UN Climate Negotiations, the Conference of Parties (COP), in 2017 and 2018 and will be co-leading the first U.S. indigenous youth delegation to the negotiations, COP25, in Santiago, Chile this December. He has been able to advocate for indigenous rights and sovereignty in the international conversations aiming to address climate

change. In 2018, he was recognized with a Dreamstarter Grant from Running Strong for American Indian Youth to work on higher education accessibility issues for Navajo high schoolers living on the reservation. Although his interests and advocacy transcend many disciplines and labels, most of his work is focused in increasing indigenous representation in climate activism, politics, and higher education.

Alternative Biosorbent Design and Implementation

Melissa JAcquez
UC Berkeley
Biosorbtion, water remediation, Heavy metals, adsorption,

Drinking water contamination from mine tailings containing high concentrations of heavy metals poses a serious threat to human health around the world. Cadmium is a common heavy metal associated with mine tailings and industrial emissions whose presence in drinking water has become an increasing concern in recent years. The main health concerns due to cadmium exposure include severe kidney, liver, bone, and blood damage. This research studied the ability of untreated and nitric acid-treated corn cobs to effectively remove cadmium from contaminated water samples. Widely grown in the United States,corn production produces 120 million tons of biomass waste available for potential reuse. Corn cob biosorbent was dried, pulverized, and sieved in addition to being treated with nitric acid and sodium hydroxide to increase its sorption potential. The biosorption capacity of corn cobs was modeled by creating an isotherm for cadmium and both treated and untreated scenarios. A bench-scale adsorption column was constructed and tested to create a model for the removal of cadmium in a full-scale remediation setting. The implementation of this research, by using waste corn cob as sorption media, proposes a sustainable alternative to drinking water treatment by illustrating an environmental engineering approach to heavy metal remediation.

Presentation Type: Poster Presentation

Presenter: Melissa JAcquez
Tribal Affiliation: Navajo (Dine)
Email: melissa.s.jacquez@gmail.con
Biography: Melissa Jacquez just graduate with a bachelors of environmental engineering and is attending UC Berkley for a master in engineering as a GEM fellow. Her dream is to pursue phd and help tribal communities with contaminated water.

Analysis of FEAST spectral approximations using the DPG discretization

Benjamin Parker
Portland State University
Mathematics, Numerical Analysis, Eigenvalues, Partial Differential Equations, FEAST, DPG

A filtered subspace iteration for computing a cluster of eigenvalues and its accompanying eigenspace, known as “FEAST”, has gained considerable attention in recent years.
We show the results we obtained when FEAST and the Discontinuous Petrov Galerkin (DPG) method are applied to compute part of the spectrum of an
unbounded partial differential operator. The theory also provides bounds on the discretization errors in the spectral approximations. We show the results of numerical experiments
for simple operators, such as the laplacian, to illustrate the theory. The utility of the algorithm is illustrated by applying it to a reaction-diffusion operator to compute guided
transverse core modes of a realistic optical fiber.

Presentation Type: Poster Presentation

Presenter: Benjamin Parker
Tribal Affiliation: Squaxin, Turtle Mountain Ojibwe, Cree
Email: bqp2@pdx.edu
Biography: Benjamin Quanah Parker is an enrolled member of the Squaxin tribe in the state of Washington and is a current officer of the Portland State University student AISES chapter in Portland, OR. He holds a Bachelor of Arts degree and a Master of Science degree in Mathematics, and he is currently working on his doctorate in the Mathematical Sciences program at Portland State University. Ben’s research areas include numerical analysis, partial differential equations, and eigenvalue problems.

Characterizing the Disease Transmission Dynamics of Pseudoloma neurophilia (Microsporidia) in Laboratory Zebrafish

Corbin Schuster
Oregon State University
Microbiology, Parasitology, Fish diseases

The zebrafish is a rapidly expanding high-throughput biomedical model that is employed in various research areas, from spinal cord regeneration to immunological studies. However, Pseudoloma neurophilia (Microsporidia) is an opportunistic intracellular pathogen that is a rapidly expanding threat to this model. In 2010, P. neurophilia was diagnosed in nearly 75% of all zebrafish facilities that report to the Zebrafish International Resource Center (ZIRC) in Eugene, Oregon (Murray et al. 2011). Today, that number has dropped to nearly 50% due to increased control efforts, but P. neurophilia still poses a major risk to the model as the only effective control method is avoidance. Diagnosis of this parasite is invasive and requires lethal laboratory techniques to positively identify P. neurophilia spores (Sanders et al. 2012). Thus, to address the expansion of P. neurophilia in zebrafish facilities, we are working to develop a sensitive non-invasive assay that will provide zebrafish facilities the ability to detect and eradicate the microsporidium from their facilities, as this pathogen has been found to cause non-protocol induced variation. Thus, our study characterizes the disease transmission dynamics of P. neurophilia in zebrafish by coupling molecular diagnostics and histopathology.

Presentation Type: Poster Presentation

Presenter: Corbin Schuster
Tribal Affiliation: Yakama
Email: schustco@oregonstate.edu
Biography: Corbin is an enrolled member of the Yakama Nation and has been a student member of AISES since 2016. Corbin completed his B.S in biomedical science at Heritage University in May of 2018 and immediately pursued a doctoral program in Microbiology. He is now a second year PhD student at Oregon State University where he specializes in molecular diagnostics of infectious diseases of both terrestrial and aquatic animals. After completion of his terminal degree, in a concerted effort with the Yakama Nation, he intends to transform science policy on the reservation and run a tribal diagnostic lab, where he can work to train the next generation of Yakama Scientists.

Design Considerations for Waste Water Treatment Facility Using Solar Energy for Agriculture and Potable Usage on Acoma Pueblo Reservation

Veronique Arguello
The University of New Mexico
Renewable Energy, Wastewater

Water is a source for virtually all life forms, and it is a precious commodity especially for native communities in the Southwest. However, in the Southwest region, water is a scarce resource. Thus, protecting, preserving, and conserving water are necessary actions. With water treatment facilities, it is possible to recover and reuse water. This study performs two assessments for upgrading the facility for the Pueblo of Acoma. First is to add a solar renewable energy source to provide the power needs of the plant. Second is to add additional filtering systems to make water potable and distribute the water through the tribe or discharge in the Rio San Jose. Information was gathered through two site visits to Acoma Pueblo, meeting with the Acoma Utility Authority to discuss water usage, energy usage and needs, and cost of operations. Siting potential for solar PV infrastructure and the discharge pathway to the Rio San Jose was analyzed using Geographic Information Systems software, utility maps, and other information from tribal visits. The results can provide information that can be used for future water projects and renewable technologies development for the Pueblo of Acoma, particularly for water treatments to supply agricultural needs or potable water.

Presentation Type: Poster Presentation

Presenter: Veronique Arguello
Tribal Affiliation: Acoma Pueblo/Kewa
Email: varguello@unm.edu
Biography: Veronique Arguello is from the Pueblo of Acoma and Kewa (Santo Domingo Pueblo). She is in her senior year of earning her undergraduate degree in Environmental Planning and Design at The University of New Mexico. After earning her degree, she plans on entering the planning field and working on projects for communities in New Mexico. She's wants to take her skills and higher education back to her tribe in Acoma Pueblo and help with planning and developing sustainable infrastructures that will benefit the tribe while preserving sacred lands and her culture.

Elucidating the Regulation of MAP Kinase Pathway Delayed-Early Gene Targets

Kali Dale
University of Utah
Cancer Biology

RAS and its downstream effector, BRAF, are commonly mutated proto-oncogenes in many types of cancer. Mutationally activated RAS or BRAF signal through the MEK→ERK MAP kinase pathway to regulate key cancer cell hallmarks such as cell cycle progression and reduced cell death. We classified positively RAS/RAF-regulated genes into two lists, immediate-early and delayed-early response genes (IEG and DEG). Canonical targets of sustained RAS/RAF activation that are also resistant to protein synthesis inhibitor, cycloheximide, are IEG. Expression of genes that require sustained, high-level activation of MAPK signaling mediated by oncogene activation and are sensitive to cycloheximide we classified as DEG. We have identified over 300 genes that fit the DEG classification using RNA-sequencing. However, the regulatory mechanisms for this class of genes remain obscure. We use integrin b3 as model to test our hypothesis that there is a different mechanism of regulation for DEG compared to canonical regulation of IEG. To determine if there is an underlying regulatory logic to the observed effects of DEG we linked altered expression of DEG with induced changes in chromatin structure using high-throughput sequencing and chromatin immunoprecipitation of active transcription marks. This work will elucidate the regulatory properties of oncogenic progression in BRAF mutant cancers.

Presentation Type: Poster Presentation

Presenter: Kali Dale
Tribal Affiliation: White Earth Ojibwe
Email: kali.dale@hci.utah.edu
Biography: Kali Dale is a member of the White Earth Band of Ojibwe Indians of the Minnesota Chippewa. Born and raised in Bemidji, MN, Kali graduate from the University of MN - Morris with a BA in Biochemistry in 2014. Currently, Kali resides in Salt Lake City, UT where she studies transcriptional regulation in Dr. Martin McMahon's laboratory as a PhD candidate at the University of Utah. Kali loves being in the mountains and especially enjoys hiking in the summer and skiing in the winter.

Ensuring streambed stability in culverts for prolonged fish passage

Tyler Fouty
Washington State Univeristy
Water resources, Sustainability, Fish barrier, Stream simulation design

Fish barriers are a worldwide problem because they prevent the migration of fish to their spawning grounds located upstream. The reduction of spawning grounds has led to widespread population decreases in the Pacific Northwest. Washington State began implementing new design policies in 1999 to replace fish barriers, most notably stream simulation culverts. These culverts incorporate a sediment lining, providing an environment more conducive to migration immediately after the installation of a culvert. The design of the simulated streambed must balance engineering and ecosystem factors, but there is little guidance on how to maximize the lifespan and to preserve the channel shape. In our research we are investigating the adding of coarse material (coarse bands) to a simulated streambed in a flume to provide stabilization by reducing the sediment transport. The streambed saw flow types of one, two-half and five-year flood events. After each flood event cross section profiles are taken and analyzed in a home-grown MATLAB program to determine the stability and sediment transport. The present of coarse bands increase stability and reduced sediment transport by +70%. These combined changes are expected to increase the lifespan of simulated streambeds, promote fish migration, and while maintaining a low flow channel.

Presentation Type: Poster Presentation

Presenter: Tyler Fouty
Tribal Affiliation: CSKT
Email: tyler.fouty@wsu.edu
Biography: Tyler has been a student member of AISES since 2015 . He completed his undergraduate degree in Hydrology at Salish Kootenai College and is now pursuing his Masters/Doctoral degree in Civil Engineering (Water Resource) at Washington State University.

How Parents who have a Fetus/Neonate Diagnosed with A Life-Threatening Congenital Heart Defect Make Treatment Decisions: The Importance of Quality of Life

Sierra Penn
Haskell Indian Nations University
Decision Aids, Risk communication, Health Behavior and Education

Parents with a fetus/neonate diagnosed with a life-threatening congenital heart defect (CHD) are confronted with making time-sensitive decision of choosing between termination, comfort care, or surgery. The purpose of this study was to understand how parents made this challenging treatment decision. Ten focus groups were conducted in Salt Lake City, Chicago, Durham and Washington, DC with 5 groups composed of parents who pursued surgery and 5 groups of parents who chose comfort care or termination. Transcripts were coded analysis to identify key themes and one theme was about quality of life for the fetus/neonate. More specifically, parents discussed financial circumstances and the impact of the decision on marriages and their other children. Parents varied considerably in what quality of life of their fetus/neonate meant to them. “It may be showing the baby what love was,” “taking it day by day because tomorrow could change,” “having their child experience the typical life of a child,” “spreading the same amount of love to every child,” or “knowing their baby did not suffer.” Finally, parents often expressed that they have more information and resources when making the decision. Future research needs to develop and test methods for improving parent knowledge and decision making.

Presentation Type: Poster Presentation

Presenter: Sierra Penn
Tribal Affiliation: Navajo
Email: sierrapenn@yahoo.com
Biography: Sierra Penn is a going to be a senior at Haskell Indian Nations University. Where she will be getting her bachelor’s degree in Environmental Science. She is a team captain on the women’s basketball team and was awarded on of the 2018-2019 Academic All-Conference Honoree. The past three semesters she has been on the presidents list and dean’s list. She is currently doing clinical research with Afib and Congenital Heart Defects in a fetus at the University of Utah for the summer. After graduation she plans on pursuing a career in the healthcare field.

Laboratory Evaluation of a Closed System Drug-Transfer Device Using Volatile Challenge Agents and a Real-time Detection Technology

Mirle Pena
NIOSH Centers for Disease Control and Prevention
CSTD; SIFT-MS; NIOSH

The growing number of chemotherapy and other invasive treatments have increased hazardous drug exposure to healthcare workers, that lead to severe health outcomes. Closed system drug-transfer devices (CSTDs) were developed to reduce exposure and are currently used by healthcare workers when compounding and administering the drugs. The increased use of CSTDs have led to a need for evaluating their performance in an adequate way. Based on the protocol outlined in the 2015 NIOSH draft document, the present project aims to evaluate a commercially available CSTD with different challenge agents (A, B, and C) with a new technology called Selected Ion Flow Tube Mass Spectrometry (SIFT-MS). For the evaluation of the device, three tasks were performed: Tasks 1 and 2, involve the compounding of the drug, and Task 3, mimics drug administration. We observed the highest vapor concentrations for all three agents in Task 1. Agent C had the highest concentrations recorded reaching more than 400 ppm in Task 1. According to the statistical analysis, the IV adapter in Task 3 is more efficient in containing the solution's vapors and preventing leaks. More CSTDs still need to be tested, but this experiment served as an exploratory project for future CSTD evaluation.

Presentation Type: Poster Presentation

Presenter: Mirle Pena
Tribal Affiliation:
Email: ibtmirlepena@gmail.com
Biography: Mirle Pena is a recent graduate of the Universidad Autonoma de Queretaro. She earned a Bachelor's degree in Biotechnology Engineering. Mirle hopes to pursue a PhD in epidemiology, specifically relating to infectious disease. She is passionate about mosquito borne illnesses and hopes to help to create an organization like the CDC in Mexico in the future.

Mercury in the Air on the Cheyenne River Reservation

Allison Gross
Timber Lake High School
Enviormental Science, Chemistry, Mercury

Mercury, one of the most dangerous heavy metals, can cause many autoimmune diseases. Parallel to this issue, there are many autoimmune diseases on the Cheyenne River Reservation. Investigation as to whether there are prevalent amounts of mercury in the air on the reservation needed to be carried out. To do this, a Hermes Personal Mercury Monitor was used to scrub the air for mercury in five different locations for nine hours, with one of the locations being tested for 9 hours, five days a week, for two weeks. This is considered the control location. The machine was placed on a high location to get undisturbed wind. The results were inconclusive; mercury was found, and in shocking amounts. However, this one-time study in not enough to prove anything, though it should bring light to an issue that is often over looked. It is important to remember that the air is only one part of what we are exposed to everyday. Next year, the soil will be tested with Columbia in the same five spots.

Presentation Type: Poster Presentation

Presenter: Allison Gross
Tribal Affiliation: Cheyenne River Sioux Tribe
Email: grossallison9@gmail.com
Biography: My name is Allison Gross, and I am a junior at Timber Lake High School, and also a member of the Cheyenne River Sioux Tribe. I am passionate about science and social justice issues.

Modeling Uncertainty with Bayesian Neural Networks

Ellis Brown
BlackRock AI Labs
Machine Learning, Bayesian Statistics, Neural Networks, Uncertainty

While neural networks are quite successful at making predictions, these predictions are usually point estimates lacking any notion of uncertainty. However, when fed data very different from its training data, it is useful for a neural network to realize that its predictions could very well be wrong and encode that information through uncertainty bands around its point estimate prediction. Bayesian Neural Networks trained with Dropout are a natural way of modeling this uncertainty with theoretical foundations relating them to Variational Inference approximating Gaussian Process posteriors. In this work, we investigate the effects of weight prior selection and network architecture on uncertainty estimates derived from Dropout Bayesian Neural Networks. In general, we find that the activation function affects the shape of the distribution (does uncertainty fan out linearly or nonlinearly and does the distribution have long or short tails?), greater depth reduces the networks uncertainty while width has no effect, and that the choice of prior can be very important both to train the network and appropriately model uncertainty.

Presentation Type: Poster Presentation

Presenter: Ellis Brown
Tribal Affiliation: Osage
Email: ellis.brown@blackrock.com
Biography: TBD

Navajo Mutton Consumption Survey

Tasha Nez
Northern Arizona University
Behavioral Science

The objective of the Mutton Consumption Survey project is to determine the consumption of mutton among the members of the Cameron and Cove Chapters as well as gain insights into the cultural significance of mutton to the community members. This project is the behavioral science piece of a larger effort to determine health risks and community impacts (e.g., consumption issues, threats to cultural values, spiritual concerns, and public health impacts) from exposure to environmental uranium contamination of traditional food for Navajo communities. This information will be important in developing policy similar to guidelines for consuming fish and other foods known to having varying degrees of contamination. An outcome of this work is the development of a culturally relevant and community-created policy with respect to contaminated traditional foods. The results will be statistically analyzed with the assistance of the Community Engagement Core from the Center for Indigenous Environmental Health Research Center at the University of Arizona. We believe that this study will result in development of policy that other Native American tribes can adapt to address contamination of traditional foods in their communities.

Presentation Type: Poster Presentation

Presenter: Tasha Nez
Tribal Affiliation: Navajo
Email: trn7@nau.edu
Biography: Tasha R. Nez is of the Salt clan, born for Near the Water clan, her maternal grandparents are the Red House clan and paternal grandparents are the Tobacco clan. She is a second-year master's candidate and a Research Initiative for Scientific Enhancement (RISE) Fellow in the Environmental Science & Policy program at Northern Arizona University. Tasha's research focuses on environmental uranium contamination of traditional livestock foods in Navajo communities. Tasha is the first from her family to attend college and she brings her native language and first-hand experiences as a livestock owner and traditional food producer from Black Mesa, AZ.

Phytoremediation towards Petroleum Spills

Cynthia Sanders
College of the Muscogee Nation
Environmental Science, Enironmental clean-up

Petroleum spills area are defined as a recognized environmental concern (rec). There may be concerns with the spread of petroleum products into the sediment and for the prevention of hydrocarbon leaching into the water source. The city of Okmulgee, has brownfield sites which were formerly used for oil field drilling. Obtainment of Phase II analysis for area would be beneficial. Phytoremediation or the technique of using plants to remove pollutants from an area is being used for this study. If the brownfield site is a part of low lying water table, the diagnostic testing could use short bushier plants. Petroleum based compounds are often defined as LNAPL products or low density; these can be abated from areas associated with underground water. One possibility has been to incorporate the Indigenous cultural plants, river cane and willow. River cane has a bushy root system which only growth behind the top soil surface. Willow has been known to reach an area's water table. Ideally, historical information about site will be critical in developing where to plant the vegetation. To determine if there is pollutant removal, the plant's roots and stem will be sampled using chemical analysis.

Presentation Type: Poster Presentation

Presenter: Cynthia Sanders
Tribal Affiliation: Muscogee Creek
Email: CSanders@cmn.edu
Biography: Cynthia Sanders has been an AISES member since 2013. She graduated from Northeastern State University in Tahlequah with a bachelor degree of science in Biology with Cellular Emphasis. Cynthia has attended graduate school part-time at Oklahoma State University while working full time for the College of the Muscogee Nation. With her students at CMN, their main research focus has been on the aquatic ecosystem concerns. Cynthia's master degree will be in environmental science with an emphasis of professional safety master. Her graduate research has been over phytoremediation of brownfield sites. Cynthia intends to continue phytoremediation research into her future PhD and professional training.

Relationships in Science: Enhancing research program benefits for undergraduates

Adam Murry
University of Calgary
Climate and Aerosol Research; Undergraduate Research Programs

This study reports the 5-year summative evaluation results of a Research Experience for Undergraduates site hosted at Portland State University's Center for Climate and Aerosol Research. The program is a 10-week summer research internship that provides hands-on research experience with a specific emphasis on recruiting and supporting sophomore students who are underrepresented in science majors and professions (i.e., rural and Indigenous students). Data collected before, during, and after the program was analyzed to assess changes over the course of the program along with program components that predicted those changes. As hypothesized, a within-between-subjects MANOVA showed the program to be successful in significantly increasing knowledge of atmospheric science and intrinsic motivation to major in science while decreasing extrinsic and a-motivation to major in science. Unexpectedly, identification with science and self-efficacy for atmospheric science research did not change significantly, and career aspirations in research and self-efficacy for the program decreased significantly. A subsequent path analysis showed that satisfaction with three types of relationships in science (i.e., with adviser, research team, and peers) predicted changes over the course of the program. Results are interpreted through social identity theory and recommendations for the prioritization of hands-on research experience and student-scientist socialization activities are provided.

Presentation Type: Poster Presentation

Presenter: Adam Murry
Tribal Affiliation: Apache
Email: adam.murry@ucalgary.ca
Biography: Adam Thomas Murry (Apache), PhD, is an Assistant Professor of psychology at the University of Calgary. Adam's PhD is in applied psychology with an emphasis in industrial-organizational psychology and research methods. His research interests span a range of topics, all related to advancing representation and self-determination of Indigenous peoples in the US and Canada. Research projects include defining Indigenous mentorship in the health sciences, teacher mental health in on-reserve schools, science education and undergraduate research programs for Indigenous students, Indigenous employment, tobacco use and Native youth, special education services for Native parents, culturally response education design and evaluation, and sustainable environmental management. Adam currently lives in Calgary with his family.

The use of contact angle and a laser surface analyzer to examine the effect of surface preparation and powder adhesion

Henrietta Tsosie
Drexel University
adhesion, materials science, pharmaceutical powder, compaction

The purpose of this work was to evaluate the powder to metal adhesion, or sticking, behavior of mannitol following surface preparation of a metal punch tip. This was analyzed using a newly designed instrument that consists of a non-contact laser sensor along with surface contact angle analysis. A removable upper punch tip was buffed using Simichrome paste and a cotton swab. The tip was then sonicated using a metal cleanser solution and deionized water. The punch surface was dried using compressed air. SD200 tablets were compacted to 12kN using an in-die density target of 90%. The punch surface was analyzed using the laser surface analyzer. Contact angle measurements of the surface were completed. These were repeated for a punch surface that was then under atmospheric conditions for 36 hours. Contact angle measurements of the punch surface depicted a hydrophilic to hydrophobic behavior before and after a compact was made. Laser results depicted high sticking for SD200 and visual observations were confirmed. In this work, we have shown that sticking is highly dependent on the state of the punch surface. Sticking was decreased after the punch tip sat in atmosphere conditions depicting the complex nature of adhesion measurements.

Presentation Type: Poster Presentation

Presenter: Henrietta Tsosie
Tribal Affiliation: Navajo
Email: htsosie@gmail.com
Biography: Henrietta is currently working on her doctoral degree in Materials Science & Engineering at Drexel University in Philadelphia, PA with plans on completion in June 2020. She earned her BS in mechanical engineering in 2009 and her MS in materials science and engineering in 2011, both obtained at the Illinois Institute of Technology in Chicago, IL. Her current doctoral thesis work is on the adhesion of pharmaceutical powders to steel components.

Understanding Forest Interaction in a Rural Alaskan Village

Antoinette Shirley
Michigan State University
Forestry, Indigenous knowledge, Alaska, Hydaburg, TEK, Forest

Indigenous knowledge and practices are often overlooked in the forestry science community. This study looked at Indigenous interactions with the forest to understand the amount and type of interactions that the community has with the surrounding forest. The data was gathered through observation and interviews with community members and a tribal scientist in a rural Alaska Native village. The study found that this particular Alaska Native community has an extensive knowledge base of, and connection with, the surrounding forest—which influences the community's care and treatment of the forest. The study suggests the inclusion of more Indigenous views in forest conservation methods could lead to more positive conservation outcomes.

Presentation Type: Poster Presentation

Presenter: Antoinette Shirley
Tribal Affiliation: Navajo
Email: shirle14@msu.edu
Biography: Antoinette Shirley is a Navajo/Latina who has been a student member of AISES since 2016. She is interested in Indigenous knowledge and involvement in forestry conservation issues. Antoinette received her Bachelor of Science degree in Zoology from Humboldt State University. Currently, she is working on her Doctoral degree in Forestry at Michigan State University. She is also a Graduate Research Assistant in the Michigan State University Native American Institute.

Variance in Mode of Detection for Breast Cancer by Breast Density and Stage at Diagnosis: A Pilot Study

Susanna Basappa
Mayo Clinic
Breast Cancer, Mode of Detection, Breast Density, Stage at Diagnosis

In a US population-based cohort of women who have developed first time breast cancer, we will 1) determine the variance in mode of detection, and 2) determine if mode of detection varied by breast density or by stage at diagnosis. We identified 386 women with a diagnosis of breast cancer (using ICD codes) within a 7 county, 98.5% coverage database. We randomly sampled 30 women and performed chart review. The data were collated in REDCap, and reported with descriptive statistics. In our pilot sample (n=30), 33% (10/30) of women had DCIS, 30% (9/30) had non-advanced, and 37% (11/30) had advanced cancer. For women with DCIS, 90% (9/10) were found on screening mammography, compared to 44% (4/9) of non-advanced, and 45% (5/11) advanced cancers. Approximately 43% (13/30) of women in this sample had dense breasts. Interestingly, 61.5% (8/13) women with dense breasts, and 62.5% (10/16) of women with non-dense breasts had screening mammography as the mode of detection. Among women with dense breasts, 46.1% (6/13) had DCIS, 30.8% (4/13) had non-advanced, and 23.1% (3/13) had advanced cancer, while for women with non-dense breasts, 25% (4/16) had DCIS, 31.2% (5/16) had non-advanced, and 43.8% (7/16) had advanced cancer. Further analysis is required.

Presentation Type: Poster Presentation

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