BIO5 INSTITUTE'S

KEYS

20th ANNUAL RESEARCH SHOWCASE

THE UNIVERSITY OF ARIZONA
KEYS
Research Internship

2026

Dear Interns, Families, and Friends,

Thank you for joining us to celebrate the 2026 KEYS Research Internship cohort and the 20th anniversary of the program.

The 58 students who make up the 2026 cohort were chosen from our largest ever application class of over 500. They have been working in labs across Tucson and Phoenix, as well as online as part of our virtual cohort.

Over the past seven weeks, these students immersed themselves in hands-on research projects that spanned a diverse range of bioscience and physical science disciplines from cancer biology and biomedical engineering to neurodegenerative disease, environmental science, optics, and physics. With the mentorship of University of Arizona and BIO5 Institute researchers, these young scientists have contributed meaningfully to projects while gaining valuable research training that will serve as a foundation for their future STEM pursuits.

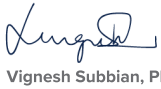
KEYS began 20 years ago as a way to provide early access to in-depth research opportunities, helping to prepare students to become the next generation research workforce. Throughout the past two decades, the program has evolved to become the gold standard of what research training can be. Alumni are now working in research fields, completing advanced degrees, and mentoring their own trainees.

This program thrives because of the commitment and generosity of so many. We extend our deepest appreciation to the faculty mentors, research staff, postdoctoral scholars, graduate and undergraduate students, and KEYS staff who have guided our interns with expertise and care. Each year, more than 150 individuals contribute to this collective effort, and their dedication makes a lasting impact on every intern's journey.

We are also sincerely grateful to our donors and program sponsors. Your continued investment makes it possible for KEYS to grow, reach new communities in Arizona, and provide students with transformative access to world-class research environments before they enter college.

Together, we are shaping the next generation of researchers, engineers, and innovators. As we celebrate our 869 KEYS alumni and the outstanding class of 2026, we look forward with confidence and pride to all that lies ahead for these promising young minds.

Kelle Hyland
Program Manager,
KEYS, BIO5 Institute



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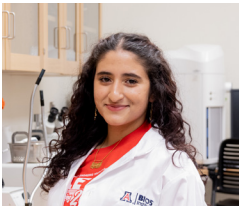
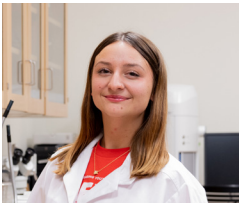


Fatima Al Zubaidi

The Effects of Cell Cycle Inhibition on G-quadruplex Levels

PI - Dr. Jacob Schwartz

Ewing sarcoma (ES) is the second most common pediatric bone cancer that affects about 250 people each year[1]. Genetically, most Ewing sarcomas are characterized by a specific translocation that fuses an *EWRS1* gene on chromosome 22 with a *FLI1* gene on chromosome 11. Ewing sarcoma is a transcriptionally addicted tumor, which results in high levels of secondary DNA structures like R-loops and G-quadruplexes. These structures can act as barriers to regulate transcription. This study examined the effects on G-quadruplex levels in ES cells, by stopping cell cycle through the removal of fetal bovine serum over 24 and 48 hours. We observed that stopping the cell cycle resulted in increased G-quadruplex levels, indicating that cell cycle inhibition can limit ES's ability to resolve these secondary structures.



Olivia Allen

A Clean and Green Approach to Safer Tomatoes; A Miracle of Natural Sanitizers

PI - Dr. Sadhana Ravishankar

Improper handling of fresh produce can cause foodborne pathogen contamination. *Salmonella* causes consistent concern, as it is linked to 1 million illnesses annually, and thrives in environments with inadequate sanitation and improperly stored foods (7). Tomatoes, specifically, do not go through a kill-step, also known as a decontamination process, to kill off potential pathogens, making them more susceptible to carrying *Salmonella*. The question that this project addresses is, do plant-based antimicrobials applied using fogging reduce the population of *Salmonella* on Roma and beefsteak tomatoes? The tomatoes were inoculated with *Salmonella* and treated with plant-based antimicrobials using fogging. The surviving *Salmonella* after treatments were enumerated. The results suggest that plant-based antimicrobials applied via fogging have the potential to improve the overall safety of tomatoes.

Julian Amaya

Characterization of MRP2 Mislocalization in Murine MetALD

PI - Dr. Nathan Cherrington

Steatotic Liver Disease (SLD) affects over 30% of adults worldwide with rising incidence[3]. The Cherrington lab has shown that transporter proteins are altered in metabolic dysfunction-associated steatohepatitis (MASH), disrupting drug disposal, and increasing systemic drug accumulation[4]. My project examines changes of MRP2 transporters in mice with metabolic dysfunction- and alcohol-associated liver disease (MetALD), an SLD sharing features of both MASH and alcohol-associated liver disease[2]. We used immunohistochemistry and microscope imaging to qualitatively evaluate MRP2 localization in two MetALD mouse liver tissue models: a 6-week high-fat alcohol diet model and a 10-day high-fat alcohol-plus-binge model. We then tested an AI-based image analysis method to quantify Mrp2 displacement. Current qualitative findings suggest altered MRP2 localization in MetALD mice, but larger sample sizes and quantitative validation are needed.

Abrielle Yelisa Anchondo-Leyva

Paws of Purpose: Pet-Driven Sense of Purpose Relationship to Mental Health

PI - Dr. Kerri Rodriguez

Research exploring the effect of pets on human wellbeing has many mixed findings[1]. My research addressed these findings by conducting an international cross sectional online survey. The survey focused the pet-driven purpose participants derive from their pet and anxiety and depression levels. The survey featured a shortened version of the patient-reported outcomes measurement information system[2] to identify anxiety and depression symptoms. Two Spearman correlation tests were conducted using R, with positive correlations observed between pet-driven purpose and anxiety (ρ=0.25, p=0.004) and depression (ρ=0.18, p=0.04). Moving forward, this study provides further understanding into the therapeutic role pets play in supporting individuals coping with anxiety and depression.

Kasyap Venkat Avancha

Examining Gene Expression of Potential AVM Risk Variants in Murine Tissues

PI - Dr. Katharina Schimmel

Hereditary hemorrhagic telangiectasia (HHT) is a rare genetic disorder where the capillaries between arteries and veins don't properly form, leading to arteriovenous malformations (AVMs) [1]. The factors that drive AVM formation in different organs is still unknown. We analyzed genome sequences in people with HHT to identify genes of interest, which may predispose patients to brain or pulmonary AVMs [1]. We identified variants in three genes involved in the growth of blood vessels and hypothesized that variants in the genes predispose patients to brain and pulmonary AVMs [2]. To test this, we extracted RNA from seven different mouse tissues and analyzed gene expression through qPCR [2]. The results revealed that the variants in one of the three genes may be associated with the development of pulmonary AVMs.

Aiden Bennett

Investigating the Electrical, Structural, and Optical Properties of CrPS4

PI - Dr. Kyle Seyler

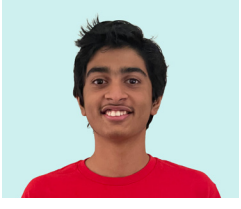
The identification of what materials are best suited for future applications is becoming increasingly more important, along with the need for a better understanding of the properties of each emerging material. To further this understanding, we first exfoliated a material with extremely promising properties called CrPS4 onto silicon chips using Scotch tape to break weak intermolecular forces between individual layers of CrPS4, leaving us with atomically thin samples. We then searched for thin samples with optical microscopy, using optical contrast as basis for sample thickness. With suitable samples, we were able to recreate second-harmonic generation [1] and photoluminescence [2] experiments done in previous studies to further solidify our understanding of the optical and structural properties of CrPS4 as a potential candidate for future technological applications.

Brayton K. Bosuku

Interactive Tool to Visualize Fractional Stimulated Adiabatic Passage (F-STIRAP)

PI - Dr. Nikolay Golubev

In a three-level quantum system with only two couplings, it is possible to control the electronic population of the two uncoupled states using a technique called stimulated raman adiabatic passage [1]. With the goal of studying electron dynamics in the Xe ion, my lab developed a variant that allows for a more generic control, expanding the method to handle cases beyond population inversion. My project focused on creating an interactive web application capable of visualizing how the time evolution of the electronic population changes as certain parameters of the system are changed. The ultimate goal is to add this tool to my PI's website, so that interested people can learn how this method works and how it can adapt to their theoretical or experimental interests.



Srinath Chervu

CoDiRA: Development and Integration of a Medical Vision Module for Diagnostic Assistance

PI - Dr. Shravan Aras

My project focused on creating a vision module for CoDiRA, a medical kiosk designed to provide accessible healthcare support to rural and underserved communities. The goal is to allow CoDiRA to analyze medical images to give patients more accurate diagnoses. Dermatological images were collected from DermMNIST[1] and normalized. Six custom CNN models were built using TensorFlow by tweaking hyperparameters. The best performer was compared against Google's Derma Foundation[2] model, which was tested using the same dataset. Although the custom model achieved slightly higher metrics due to dataset class imbalances, Google's model is still preferred because it provides lesion classification, localization, and disease progression insights to support clinical decision-making. Therefore, we are opting for Google's model[2] and will investigate integration with CoDiRA.

Srinidhi Chervu

Using AZMET Weather Data to Obtain Reference ET Across AZ

PI - Dr. Ali Mohammed

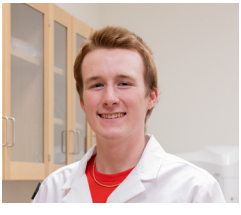
The deteriorating quality of water supplies in Arizona introduces challenges to agriculture; the crop-coefficient model is a promising solution to sustainable irrigation obstacles[1]. It uses reference evapotranspiration (ET), the baseline atmospheric water demand, and the crop coefficient (Kc) to yield crop evapotranspiration, or actual crop water demand[1,3]. We used the Deep-ET machine learning models to predict ET using historical weather data from the Arizona Meteorological Network (AZMET)[4,5]. These predictions were compared to the actual AZMET ET to gauge accuracy and understand weather variables that affect ET. The models accurately predicted weather patterns, but not variability. On high-ETo days, there is notably higher wind, longer periods of sunlight, lower humidity, and higher temperatures. Understanding these factors will help optimize irrigation decisions throughout Arizona[2].

Isobel Cooper

Assessing the Effectiveness of Adeno-Associated Virus for CRISPR Gene Editing

PI - Dr. Teodora Georgieva

Adeno-associated virus (AAV) is a vector for delivering donor DNA that can facilitate CRISPR-mediated genome editing via natural DNA exchange processes [1]. This project evaluated the effectiveness of AAV-mediated gene targeting by inserting a detectable genetic tag into a specific gene in brain cells. An AAV donor construct was designed and delivered, together with CRISPR/Cas9 components, via electroporation, which creates pores in the cell membrane to enable uptake of genetic material. Successful insertion of the tag was verified by polymerase chain reaction (PCR). The results demonstrated a higher frequency of targeted insertions compared with previous approaches, indicating improved editing efficiency. These findings support the use of AAV-mediated donor delivery for generating modified cell lines and demonstrate its potential applications in gene therapy and biomedical research.



Finley Joshua Custer

Establishment of the Metal-tolerant *Pseudognaphalium canescens* in Mine Tailings for Phytoremediation in the Arid Southwest

PI - Dr. Alicja Babst-Kostecka

Mine tailings are waste materials produced during mining[1]. Containing high concentrations of metal(loid)s, they threaten both human and surrounding ecosystems[1]. Because these metals do not degrade, contamination can persist for many years. One promising solution is to use specially selected plants that can tolerate or accumulate high concentrations of metals, known as hyperaccumulators[4]. In this study, I investigated *Pseudognaphalium canescens* (Wright's cudweed), a native plant of the arid southwestern United States with potential as a metal hyperaccumulator[5]. I grew plants in mine tailings collected from five Arizona mining sites with different soil amendments and evaluated seed germination and plant performance. *P. canescens* performed best in soils with high pH and copper content, highlighting its potential for copper-heavy mine reclamation.

Pablo Andres Fernández

Enhancing Multimodal Machine Learning Stock Market Prediction Models

PI - Dr. Haiquan Li

Modern financial markets are difficult to predict because of changes in investor sentiment after socioeconomic and geopolitical events. Through machine learning, predictive models like SwinStock, developed by my lab, can analyze human language in newspaper articles along with stock market indicators to predict stock market movement. My project focused on improving the accuracy of these models using summarization of newspaper articles with a large language model, a sentiment analysis model called FinBERT, and a machine learning architecture called Mamba, which was made to outperform traditional methods of creating patterns between words in a sentence. Results revealed that FinBERT and Mamba were able to match or exceed the accuracy of the SwinStock model for downward price movements, making them good candidates for forecasting dramatic price drops.

Sofia Garcia

Identification of Viral Silencing Suppressors (VSR) of Cacao Swollen Shoot Ghana M virus (CSSGMV)

PI - Dr. Judith Brown

Cacao swollen shoot disease, caused by a complex of *badnaviruses*, including CSSGMV, is a threat to West African cacao production. Infected cacao trees exhibit foliar discoloration, stem and root swelling, decline, and death. CSSGMV damage is associated with the inability of host plants to cleave sufficient CSSGMV-encoded RNA silencing suppressor (VSRs) transcripts. This study investigates whether the CSSGMV-Orfy protein functions as a VSR based on results of GFP-transgenic *Nicotiana benthamiana* line 16c silencing suppression assays. GFP-fluorescence and viral transcript accumulation will be quantified post-agroinfiltration using ImageJ software and qPCR amplification, with increased GFP accumulation indicating positive silencing suppression. Data collection is ongoing. Based on studies of grapevine red blotch virus, Orfy expression is expected to enhance GFP-fluorescence and transcript levels, implicating it as a VSR.

Mandeep Gorle

Effect of Disrupting Transcription Factors Gat1 and Gln3 on Cell Growth

PI - Dr. Andrew Capaldi

The nitrogen starvation response in yeast adjusts cells to nutrient stress, an important ability for survival. This response is controlled by TORC1, the key regulator for cell growth and nutrient usage (mTORC1 in humans) in which disruptions can cause diseases like cancer [3]. TORC1 controls nitrogen starvation response through transcription factors Gat1 and Gln3 [4]. We knocked-out Gat1 and Gln3, testing growth in high-quality, low-quality, and starved nitrogen environments. Interestingly, the Gat1 knockout grew better than the wild-type in the low-quality nitrogen, suggesting that while Gat1 and Gln3 are needed for growth (given by the minimal growth in the double knockout strain), Gat1 may also impair growth. Further investigation is needed, but we hypothesize that Gat1 expresses genes that slow growth, causing this growth abnormality.

Alexis Herrera Mendoza

Optimization of Expression and Purification of GFP Nanobody

PI - Dr. Tarjani Thaker

Recombinant protein expression allows large-scale production of a target protein through a genetically engineered host cell that overexpresses it[13]. Using this approach, my research focuses on expressing and purifying green fluorescent protein nanobodies (GFPnb). This single-chain antibody binds to green fluorescent protein and is a key component of the GFP-trap system[1]. GFPnb expression was induced in *E. coli*, and the His-tagged protein was purified by metal affinity chromatography[4], followed by size-exclusion chromatography[3]. Protein quality was assessed using SDS-PAGE[12], staining[6], and Western blotting[14]. Results indicate that GFPnb was aggregated and/or misfolded rather than correctly folded. Future research should optimize protein expression and purification, for example, by adjusting buffer composition and adding a reducing agent, to reduce aggregation and improve GFPnb quality.

Dinodh Shenuka Hettiwatte

How Do Excitons Tunnel Through Barriers?

PI - Dr. John Schaibley

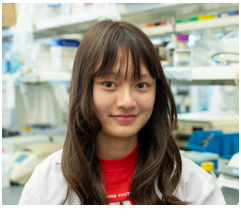
As society grows, we will need more powerful computing. Earlier research looks towards 2D heterostructures, devices that utilize excitons, which are electron-hole (absence of an electron) pairs, to compute data[2]. As such, I looked at how excitons tunnel through insulating barriers in these devices. We created a device where there were two areas where excitons could exist that were separated by a barrier. We would then use lasers to create excitons in one area and test whether they tunnel to the second area using a photoluminescence signal. Ultimately, we were able to create a device by utilizing quality material checked by atomic force microscopy; however, the device did not yield quality data. We plan to continue making devices until we can get viable data.

Alexandra Mei-Yan Ho

Establishing a Dexamethasone-Responsive Cell Line Model for Studying Erythropoiesis

PIs - Dr. Mrinalini Kala & Dr. Shalini Sharma

Bone marrow failure diseases reduce red blood cell (RBC) production, causing anemia. Current therapies include erythropoietin (Epo), signaling bone marrow cells to mature into red blood cells, and dexamethasone (Dex), a steroid protecting RBCs from immune destruction (Schippel et al., 2025). Mechanisms behind Epo and Dex are not comprehended, limiting the ability to predict treatment response and design therapies. Since primary stem cells are difficult to obtain, I screened leukemia cell lines K562 and TF-1a to establish a Dex-responsive model for future research. Using flow cytometry and RT-qPCR, CD235a, a marker of RBC maturity, decreased with Dex treatment in K562 cells, likely due to an underlying abnormality that remains to be investigated. These results highlight the need for further characterization of K562 as a model.



Olivia Hsu

Spatial Transcriptomic Profiling of Time-Dependent Gene Expression Changes in the Mouse Auditory Cortex Following Traumatic Noise Exposure

PI - Dr. Shengfeng Qiu

Traumatic loud sound exposure can alter auditory processing and contribute to disorders (Bao, 2015). The cell-type-specific and spatial molecular mechanisms underlying these changes remain poorly understood. My research investigates how traumatic noise exposure reshapes the auditory cortex transcriptional landscape over time. We assigned four groups of mice to sham control or traumatic noise exposure (1, 3, and 10 days). Brain sections containing the auditory cortex were analyzed using 10x Genomics Xenium platform to map gene expression, followed by Scanpy analysis to identify cell-type DEGs. The analysis revealed that noise exposure alters cortical gene expression in a distinct, time-dependent manner across cell types, with activated excitatory neurons showing the highest number of DEGs, reflecting synaptic changes. These findings provide insight into cell-specific mechanisms for future therapies.

Jason Jimenez

Rodent Hindlimb Replication for Osseosurface Device Testing

PI - Dr. Philipp Gutruf

Small animal models are essential for studying bone health, specifically in medical device development. The Osseosurface device collects strain and temperature conductivity data [4] but has a serpentine interconnect component that often fails due to the continuous motion of a rat's hindlimb [1]. My project addresses this by creating a biomimetic hind limb replica for durability testing of the Osseosurface. 3D printing and silicone were used to replicate bone, skin, and muscle, and different serpentine geometries and silicone encasings were evaluated by simulating the Osseosurface while monitoring electrical resistance. A first iteration of the replica broke (pelvis) before the serpentine did (~100,000 cycles) and further testing will demonstrate which type of serpentine is more mechanically reliable. Improving the Osseosurface will support long-term bone health monitoring.

David Jones

Investigating the Effects of Cholesterol in Lipids

PI - Dr. Michael Brown

Cholesterol is tightly linked to cardiovascular and neurodegenerative diseases. Membrane sterols are known to regulate bulk membrane properties, such as ordering, molecular packing, and bending rigidity. Currently, it is unclear how cholesterol interacts with different lipids and if it has for certain types. We hypothesize that small head group size and lipid chains weaken cholesterol's effects. Using solid-state ^{2}H nuclear magnetic resonance spectroscopy, we measure lipid bilayers to obtain relaxation rates (R_{1Z}), relaxation times (T_{1Z}), and order parameters from processed spectra. We found that higher cholesterol concentrations stiffen lipid bilayers, increasing membrane properties. Further studies will look into how cholesterol could be used for patients with cardiovascular and neurodegenerative diseases.

Pranav Karpagaraj

Controlling Aging & Cancer: Finding microRNA Indicators of Quiescence Using Lines

PI - Dr. Guang Yao

I sought to regulate quiescence (the intermediary between aging and cancer) using microRNAs (molecules controlling cellular processes, including quiescence) [6, 14]. I hypothesized that certain microRNAs are unique to certain quiescence depths. I computed the best line between points representing Norwegian rats' embryonic fibroblast cells' microRNAs at each quiescence depth. To assess its accuracy without brand-new data, I computed mini-lines, each time excluding one depth's data to use as testing data. The mini-lines' predictions of the quiescence depth given said testing data were no more than two off except when I excluded shallow/no or deep quiescence. The mini-lines' predictive capability proves the overall line is accurate, meaning certain microRNAs are unique to certain depths, indicating that quiescence — and as such aging and cancer — is controllable.

Alexander Suits Klyber

Developing an Interactive to Explore Molecular Dynamics in H_2^+

PI - Dr. Nikolay Golubev

To expand knowledge in quantum bonding dynamics (movement of subatomic particles though time), we built an educational website demonstrating the ultra-fast (10^{-15} seconds timescale) dynamics in molecular hydrogen upon ionization (kicking out an electron). Using HTML, CSS, JavaScript, and state-of-the-art quantum chemistry software, we built an interactive visualization of the electron and nuclear dynamics in this system, as well as their coupled motion (combined electron and nuclear dynamics). Our calculations agree with experimental results that electronic coherence (in two states at once, superposition) in this molecule dissipate on femtosecond (10^{-15} seconds) timescale due to the spatial separation (decreasing overlap) of the nuclear wave packet (a function that defines the probability of the nucleus being in some space) in different electronic states.

Aadhya S Kondapuram

The pH Switch: Rhodopsin Activation

PI - Dr. Michael Brown

GPCRs (G-protein-coupled receptors) are proteins essential in cell signaling and drug targeting[3]. Rhodopsin (a GPCR responsible for low-light vision) models the effect of cellular surroundings on protein activity. Research on pH-dependent rhodopsin activity found an outlier at pH 5.67[4]. This study aims to determine the cause of a sharp decrease in rhodopsin activity at pH 5.67 by altering buffer type, acetic acid or BTP (bis-trisphosphate), within the sample. Ultraviolet-visible spectroscopy measures the sample's light absorbance across wavelengths. Rhodopsin activation did not differ in acetic acid and BTP buffers, despite the addition of pH 6.6 sodium phosphate. Interestingly, the outlier is not seen, indicating the volatility of pH 5.67 as an endpoint, causing a pH shift. Understanding rhodopsin's interactions with its surroundings could improve drug targeting.

Sean Wyatt Kosnik

Links Between Sleep Factors and Features of FMR1 Premutation

PI - Dr. Nell Maltman

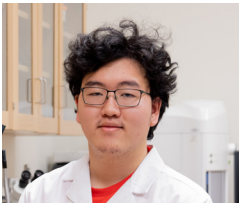
The *FMR1* premutation is a genetic condition caused by a CGG repeat expansion on the X chromosome[6]. It causes a broad spectrum of neurological outcomes[1,2,5,6], and sleep quality may be impacted, with possible links to a premutation-associated neurodegenerative condition. This study aimed to explore differences in sleep quality between *FMR1* premutation carriers and controls, and evaluate whether sleep quality predicted health, cognitive, and language outcomes. Forty-eight premutation carriers and 45 controls completed self-report and direct assessment measures, which were studied in ANCOVA and regression analyses. Results indicate worse sleep quality in premutation carriers, and sleep quality predicted anxiety and depression outcomes beyond effects of age and education. Findings suggest the need for further research of sleep over time to support intervention development.

Caroline Lasch

The Effect of Biostimulation on Microbial Hydrogen Uptake

PI - Dr. Laura Meredith

Hydrogen power could revolutionize green energy and reduce fossil fuel reliance (6), but as an indirect greenhouse gas, microbial hydrogen uptake is essential for controlling excess emissions from H_2 production and storage (1,2,3). We researched biostimulation, altering soil conditions to encourage microbial H_2 consumption via nutrient media, hypothesizing that biostimulated soils show varying uptake across hydrogen levels, reflecting microbial adaptation to soil conditions and nutrient availability. Three soils (natural desert, urban desert, H_2 power plant) were treated with mineral or carbon media and exposed to atmospheric or elevated H_2 levels. Natural desert soil with mineral media showed the greatest uptake; other combinations varied. Cold temperatures suppressed microbial metabolism, prompting a third measurement after re-incubation. Expanding on these findings could further reduce hydrogen plants' environmental impact.

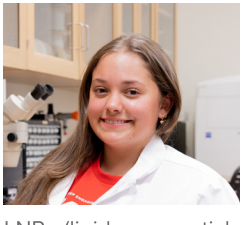


Trent W. Lee

Automatic Image Acquisition and Detection of Graphene

PI - Dr. Brian LeRoy

Graphene consists of a layer of carbon atoms and possesses unique properties. It is often exfoliated on silicon oxide wafers [7], for which the complete examination is tedious. Our lab is exploring if this task can be automated. We used a camera, microscope, controllable stage, OpenCV, and Python to create a system that automatically takes photos of samples and detects possible graphene flakes. We used ImageJ to stitch images into “maps” for use by researchers and better visualization. Our system produces readily analyzable images and successfully detects possible graphene flakes, proving that automating this task is possible. Automation allows for more efficient research on graphene and its uses. Future research could focus on incorporating machine learning into the detection of graphene and other 2D materials.

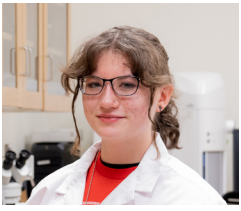


Jordan Amanda Loutfy

Conjugating Doxorubicin onto Sphingomyelin Self-Assembled into Liposomes to Increase *in vitro* Cellular Uptake

PI - Dr. Jianqin Lu

LNPs (lipid nanoparticles) are revolutionary drug delivery agents that allow for medication to be directly delivered to the target organ. My lab creates liposomes (small, lipid particles with an aqueous core enclosed by a phospholipid bilayer) as a drug delivery agent for doxorubicin (chemotherapeutic medication). For optimal uptake, the doxorubicin-conjugated liposomes should be between 50 nm–150 nm, and we monitored the Doxomes for their stability based on size and zeta potential; they remained stable and within optimal range for ten days. We cultured 4T1-triple negative breast cancer cells to create groups to receive doxorubicin treatment. We compared the Doxome with free doxorubicin, Doxil, and no treatment. Confocal microscopy revealed that the Doxome group had the quickest uptake after three hours.



Sophia Isabelle Lucarevskiy

Contest Experience Does Not Alter Brood Raiding Behavior

PI - Dr. Anna Dornhaus

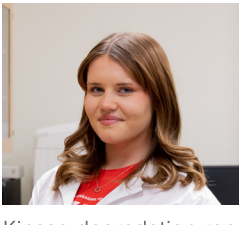
My project studied how experience in contests between ant colonies of the same species affects their behavior. A contest is a discrete negative interaction between two colonies over resources like food, mates, and space. My research is focused on brood raiding—stealing an immature ant from the opposite colony to raise in their own nests. I tested whether or not experience in contests plays a role in a colony's ability to steal brood. The data collection for this involved staging repeated contests between *Temnothorax rugatulus* ant colonies. The contests were recorded to examine their behaviors. The results showed that experience in a contest did not affect the likelihood of a colony to steal brood.

Aliyah Seren Mahloch

Empathy-Driven Prosocial Behavior in *Magel2*-Deficient Mice

PI - Dr. Haijiang Cai

Prader-Willi Syndrome and Schaff-Yang Syndrome are rare genetic disorders that share a mutation in the gene *Magel2* [1]. *Magel2* deficient mice model social impairments seen in these disorders, but the deficiency's role in empathy-driven prosocial behavior remains undetermined [2]. One mouse observed a cage-mate receiving small, distressing, though physically harmless, shocks. Empathy was measured as freezing behavior. The two mice were reunited, and prosocial behavior was measured as allogrooming. We hypothesized that *Magel2*-null mice would show reduced empathy and prosocial behavior compared to wildtype mice. These results will clarify the role of *Magel2* in social behavior.



Kendall Ann Rhoades Matchett

The Use of Fluorescent Reporters to Measure S6 Kinase Activity in Living Cells

PI - Dr. Andrew Paek

Kinase degradation reporters (KDRs) are fluorescent markers that can be used to measure the activity of kinases significant to human diseases. KDRs fluoresce when specific kinase activity stabilizes the reporter while inactivity results in reporter degradation and less fluorescence. One kinase of interest is the S6 kinase (S6K), an enzyme hyperactive in cancer. To monitor the activity of S6K, we developed a KDR that responds specifically to S6K activity. We validated our reporter by inhibiting S6K using the molecule AZD8055 and observed a decrease in fluorescence compared to our controls. This suggests our reporter is responding directly to S6K activity, opening the door for future use of KDRs in determining the effectiveness of treatments at lowering S6K activity.

Carter Robert McLane

Response to Floral Signals by Native and Non-Native Bees

PI - Dr. Daniel Papaj

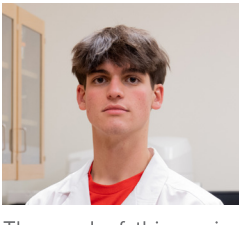
Flowers emit visual signals, including in ultraviolet (UV), which are invisible to humans, to attract pollinators [1]. Many native species of palo verde trees, UV patterns create “markers” of nectar location and flower age. Each flower has a banner petal near the nectary that absorbs UV; the other petals reflect it. This banner petal changes visually with age. I compared how native versus non-native bees respond to signals by recording landing locations and responses to flower age. Native bees probed for nectar at banner petals at a higher frequency than non-native honeybees. Both native bees and honeybees preferred to visit new flowers. In conclusion, native bees may respond more effectively to the banner signal than non-native bees, perhaps due to coevolution between bee and plant.

Kadence Modica

Loss of MAGEL2 Function Alters Anxiety-Related Behavior in a Sex-Dependent Manner

PI - Dr. Haijiang Cai

Individuals with Prader-Willi and Schaaf-Yang syndrome exhibit a high prevalence of anxiety disorders. Despite the established link between these syndromes and the loss of MAGEL2 function, its mechanistic contribution to anxiety is not well defined. To investigate this, we subjected *Magel2* knockout mice to a battery of behavioral assays, testing the hypothesis that MAGEL2 deficiency contributes to the development of an anxiety-like phenotype. We found that MAGEL2-null mice exhibited an anxiolytic-like profile, spending increased time in anxiogenic zones. Crucially, these behavioral alterations were sex-specific, highlighting a complex role for MAGEL2 in modulating affective states.

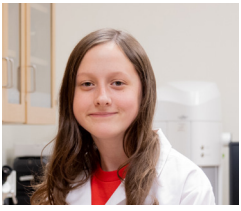


Bailey Moffett

Development of Red Blood Cell Mimicking Microparticles Using Coiled-coil Proteins

PI - Dr. Minkyu Kim

The goal of this project is to develop a microparticle with red blood cell (RBC) mimicking characteristics. RBCs can squeeze through blood vessels. Replicating this mechanism using coiled-coil proteins is the focus of the project. Coiled-coil proteins allow for refolding and self-assembly which is necessary for rebuilding the structure after it has passed through a blood vessel[1]. Candidate protein compounds were incubated then purified. Results were analyzed to verify solubility and refolding efficiency. The results from testing two candidates in the presence of urea and without urea show that the protein is not soluble in water alone, however it does have a high refolding efficiency. This provides a potential option for the use in a drug delivery system or for the creation of hydrogels.



Morgan Grace Mollberg

Evaluating Small Molecules to Treat Cardiac Hypertrophy

PI - Dr. Jared Churko

Heart damage starves cardiomyocytes (heart muscle cells) of oxygen causing connective tissue growth factor (CTGF) to bind to their receptors triggering hypertrophy (enlargement) that leads to heart failure and arrhythmias[1, 5]. I evaluated five small molecule treatments in combination with CTGF in human induced pluripotent stem cell (hiPSC) derived cardiomyocytes on their ability to target CTGF[10, 12]. Efficacy was measured by cell area and cell number. If the small molecules target CTGF, cell area will remain unchanged; if the small molecules do not target CTGF, it will remain active, causing an increase in cell area. Small molecules targeting CTGF could treat cardiomyocyte hypertrophy by preventing enlargement that metabolically starves cells leading to heart failure and arrhythmias[1, 5].

Warren Moore

Hybrid Ultrasound Technologies for Peripheral Neural Imaging

PI - Dr. Russell Witte

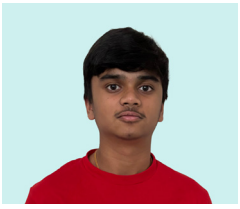
Emerging research in acoustoelectric imaging (AEI) explores how ultrasound interacts with electricity to better image the nervous system at high resolution (1–3 mm). Pressure waves interact with the biological current in nerves, creating a small additional voltage that can be detected with recording electrodes to construct 4D current density images (volume over time). I conducted a feasibility test to determine whether AEI could identify a neuropathic (damaged) nerve branch. Using a piece of asparagus as a nerve phantom, which has a similar resistivity to a nerve (1 Ω m vs 2 Ω m), we demonstrate whether the damaged branch is distinguishable from a healthy branch. This lays the groundwork for imaging live nerves.

Tara Nair

Arid-Region Irrigation Optimization: A Climate-Adaptive Deep Learning Approach

PI - Dr. Ali Mohammed

Agriculture consumes almost 70% of the freshwater supply and wastes 42% [2], rendering precision irrigation vital to combating water scarcity. Calculating reference evapotranspiration (ETo), or agricultural water demand, informs precision irrigation but requires extensive climate data [1]. Thus, I evaluated California-trained deep learning models that predict ETo using solely temperature and solar radiation, comparing ANN, LSTM, and CNN models across the Arizona Meteorological Network. The CNN peaked at R^2=0.84, with lower relative Arizona performance. A humidity marker, vapor pressure deficit (VPD), alleviated this drop. Since accounting for dryness is crucial for accurately predicting ETo in arid regions, targeting VPD and temperature could optimize precision irrigation, reducing costs while maximizing water-use efficiency. Future research pathways will evaluate all three models with added humidity (VPD) context.

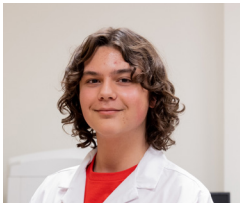


Naveen Nanthakumar

Optimal Data Harmonization for Observational Data Analysis

PI - Dr. Bonnie LaFleur

Pooling data from multiple observational cohorts can increase sample size and power for research studies. In this work, we evaluated the feasibility of pooling data from the Precision Aging Network (PAN) and the Alzheimer's Disease Neuroimaging Initiative (ADNI). We harmonized the data from both cohorts on common structures. An AI harmonization tool was created to speed up this data harmonization; this tool will enable researchers to discover similar variables across different datasets by asking plain-language questions. Feasibility was evaluated using hypothesis tests and standardized mean difference for demographics, cognitive status, and cytokines (immune proteins) data. We found ADNI and PAN proved feasible after data transformation and statistical adjustment.



Andrew Osborne

Multiplexing Toroidal Gas Detection via Microfluidic Device

PI - Dr. Euan McLeod

Silicon microtoroids belong to the whispering gallery mode (WGM) sensor family, capable of detecting gases in sub PPT concentrations[1]. Fabricated via lithography on a silicon wafer, they are functionalized with custom polymers targeting specific gases. Past work has been limited to detection of a single gas due to polymers functionalizing the entire chip containing the microtoroids. This project developed a microfluidic device that facilitates functionalizing microtoroids individually, which allows detection of multiple gases with a single device, referred to in literature as "multiplexing". The device was tested to ensure isolation of each channel, multi-fluid pressure resilience, and compatibility with microtoroids and was optimized for streamlined fabrication. As a result of this project, unique polymers can be used to functionalize individual microtoroids for corresponding target gases.

Mohit Prathipati

Deep Learning Approach for the Analysis of Protein Secondary Structures

PI - Dr. Kenry

Many optical spectroscopic techniques have been used to understand the secondary structures of proteins. The use of machine learning to predict/analyze spectroscopic data has also been increasingly employed in research (Wang & Kenry, 2025). My research's focus was developing a one-dimensional convolutional neural network (1D CNN), which is a type of artificial intelligence, to analyze spectroscopy data. Analyzing this data will help us understand the secondary structures of proteins, potentially accelerating the development of effective biomaterial applications and personalized medicine. After optimizing the model, the R^2 value (measurement of accuracy) increased to ~0.7. These results prove our hypothesis that information about the secondary structures can be found within the spectral data, and that machine learning could be used to retrieve that information.

William Miles Ruiz

The Role of Hydration in Using Impedance as a Predictor of Wound Healing

PI - Dr. Kellen Chen

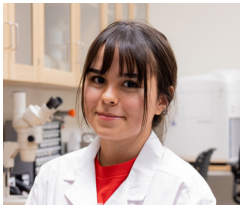
Chronic wounds fail to progress through the coordinated phases of repair and often remain open for weeks to months[3]. These wounds affect millions of patients in the United States and impose substantial healthcare costs[8]. To address this, we sought to predict future wound healing by tracking impedance, tissue's opposition to alternating electrical current, while noting treatments that would affect wound hydration. We hypothesized that treatments increasing hydration would decrease a wound's impedance. We found that only properly healing wounds showed a decrease in impedance due to increased hydration, while impedance generally increased as wounds healed overall. Going forward, we hope to use this information, along with other data points, to generate accurate predictions that optimize and improve patient care.

Luis Angel Salcido Zamarron

Development of a Plasmid Tool to Study STMN2 Promoter Under Different Treatment Conditions

PI - Dr. Haining Zhu

Amyotrophic lateral sclerosis (ALS), a neurodegenerative disease, targets motor neurons-causing muscle weakness and other disabilities[2]. Research reveals that neuronal TDP-43 protein delocalizes from the nucleus to the cytoplasm causing insoluble tangles, leading to less nuclear TDP-43 and resulting deregulation of STMN2 (protein) to disrupt regeneration of motor neurons[3]. My project involves building a plasmid tool with the STMN2 gene promoter controlling levels of easily detectable luciferase (creates bioluminescent molecule)[6] to model how much STMN2 is being expressed within cells. The NCBI genome browser was used to design two sets of primers to optimize cloning success rates. Our results and sequencing show that my insert has the correct length and sequence. The tool will make experiments run smoother and easier when studying STMN2 in ALS.

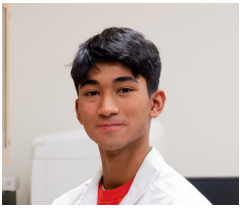


Vivian Cait Schweska

Analyzing the Gait of Alzheimer's Disease F344 Rats

PI - Dr. Stephen Cowen

Alzheimer's disease (AD) remains relatively untreatable because of its complex pathology (1). Our lab investigates this disease with the utilization of transgenic AD rat models. One of these model strains is hypothesized to have abnormalities in their gait or weight distribution, possibly skewing behavioral research. Similar motor function deficiencies appear in humans with AD and alike rat models (2,3), but this strain lacks characterization, having only been evaluated using rudimentary measures of motor coordination (3). Instead, this study uses the CatWalk-XT gait analysis system to assess and appropriately describe rodent locomotion. Results exhibited a disproportionate stance in this strain's hind paws then their front. Further research is needed to verify this parameter's correlation to motor abnormalities and improve future AD research using this strain.

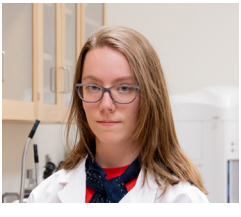


Luki Shirai-Vescio

Finite Element Analysis and Mechanical Improvements to the Cell-Acquiring Fallopian Endoscope

PI - Dr. Jennifer Barton

Ovarian cancer is the deadliest gynecological cancer, largely because of inadequate early-detection methods. My lab has developed a fallopian tube endoscope capable of imaging precancerous lesions that potentially indicate future ovarian cancer development years before clinical onset. Although the current prototype shows promise for *in vivo* use, the handle and dispenser tip assembly (necessary for cell collection) exhibits structural shortcomings. Using SolidWorks CAD software, I engineered three novel handle/tip designs derived from the original model, fabricated via Formlabs resin printing. Each prototype underwent linear and torsional stress simulations, replicating physician-applied forces, to identify structural weak points and quantify mechanical strength. Design 2 emerged as optimal, achieving the highest factor-of safety-to-material-usage ratio, advancing development of an affordable, clinically effective tool for early ovarian cancer detection.



Katie Alexandra Silcox

Altering Vitamin B5 levels in *Anopheles stephensi* to Starve Malaria Parasites

PI - Dr. Michael Riehle

Malaria is a disease caused by *Plasmodium* parasites and transmitted by *Anopheles* mosquitoes. By manipulating a variant of PanK (enzyme that regulates vitamin B5, an essential nutrient)[5], my lab hopes to starve *Plasmodium* in the mosquitoes without harming the host.[4] My research focused on the egg production of the transgenic mosquitoes used in this process[2] and the location of their PanK isoform in their cells[1]. Despite finding that the mitochondria did have traces of PanK, more research is required to confirm this. Egg production from transgenic and non-transgenic females showed no significant differences, meaning they are more likely to disperse their malaria-inhibiting genes. With additional research, we hope that these findings will pave the way for the negation of malaria and similar diseases.

Joshika Singh

Ferret vs. The Autonomous Ball: Analyzing Ferret Brain Aging Through Robotics

PI - Dr. Elizabeth Hutchinson

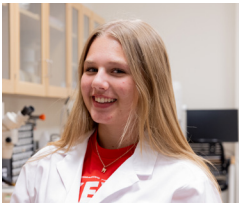
Ferrets are the smallest gyrencephalic animal[1] and possess many immunological similarities to humans[2], making them valuable to further study and understand. Based on prior research, we hypothesized that age-related brain shrinkage in ferrets would result in reduced natural hunting behavior. To test this, we recorded the ferrets' interactions with a prey-mimicking robot (Sphero Ball) and analyzed the videos through a manually trained machine learning program. Our results demonstrated that older ferrets interacted with the ball less and exhibited overall decreased natural hunting behaviors than younger ferrets, confirming the behavior model. These results expand our knowledge of ferret aging, allowing for future applications as a model in cognitive diseases such as Alzheimer's, and can be used to aid the conservation of the endangered wild black-footed ferret.

Medha Sivakumar

IL-6 Baseline Predictions on Two-Year Cognitive Decline on the MoCA

PI - Dr. Bonnie LaFleur

As people age, rising levels of inflammatory proteins like IL-6 (Summer Insights Team, 2026) often accompany cognitive decline. This project asked whether higher baseline IL-6 predicts greater cognitive decline over two years, and whether carrying the *APOE ε4* gene, the strongest known genetic risk factor for Alzheimer's disease, strengthens that relationship. Using MoCA scores from 499 cognitively normal and MCI adults across the PAN and ADNI studies, we found no significant effect of IL-6 alone on decline, but *APOE ε4* carriers, more prevalent in ADNI (47.5%) than PAN (26.9%), showed significantly greater decline overall. When cohorts were pooled, IL-6 and APOE4 interacted significantly (p=0.018), suggesting inflammation's cognitive impact depends on underlying genetic risk.

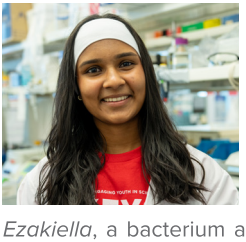


Morgan Gianna Speder

Mechanisms of Irregular Heart Rhythms in a New Rat Model of Cardiac Disease

PI - Dr. Shanna Hamilton

TECRL is a protein located within the heart muscle cells (cardiomyocytes). When mutated, TECRL has been proven to be the cause of certain calcium dependent arrhythmias (irregular heartbeat caused by spontaneous calcium release) [1], which can lead to sudden cardiac death [5]. To find out why TECRL has this effect, I looked at live rat cardiomyocytes (healthy and mutated) and recorded their calcium behavior. I compared the two groups of cells and observed any differences. The TECRL mutated cells released calcium more spontaneously than the healthy cells, which means TECRL is directly affecting the cells' calcium release function, and is why its mutation causes arrhythmias. Knowing this will lead to new therapies and treatments for patients experiencing these arrhythmias.

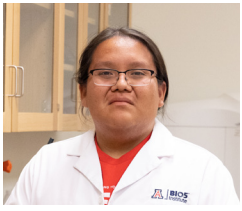


Manassa Suresh

Identification and Characterization of Novel Endometrial *Ezakiella* Strain U33

PI - Dr. Melissa Herbst-Kralovetz

Ezakiella, a bacterium associated with gynecological diseases, inhabits the endometrium, an undercharacterized site. Our aim was to understand characteristics of an unclassified endometrial strain of *Ezakiella*. Strain U33 was isolated from the endometrium and cultivated anaerobically in enriched media to optimize growth. Whole-genome sequencing and genomic analysis were performed. Taxonomic classification identified U33 as a novel *Ezakiella* species. *Ezakiella* U33 grew best on nutrient-rich media, forming small, opaque-white spherical colonies, and identified as Gram-variable cocci. *Ezakiella* U33 has a genome size of 1.84 Mbp with 49 tRNA, 6 rRNA, and 35.94% GC content. Future work includes analyzing *Ezakiella* U33 for unique features of this species. Identification of novel endometrial strains establishes a foundation for future research on endometrial microbiota and their role in gynecologic diseases.

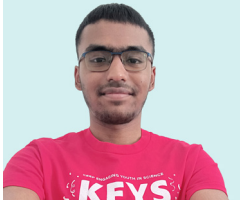


Hunter Cole Tallsalt

Fill in the Gap: mTORC2 as a Central Hub for Migratory Signaling in Mammary Epithelial Cells

PI - Dr. Pascale Charest

Directed cell migration is essential for normal human body regulation. If cell migration is dysregulated, it can become pathological like in the case of cancer metastasis. The mechanistic target of rapamycin complex 2 (mTORC2) regulates cell migration, and previous research has found certain chemoattractants activate mTORC2. This study analyzes cell migration with chemoattractant stimulation utilizing live-cell imaging. MCF10A–breast epithelial–cells were seeded, scratched, and stimulated with the chemoattractants EGF, IGF-1, CXCL12, and LPA. Their cell migration was recorded over 24 hours. The results show the chemoattractants promoted cell migration more than the control. The data supports our hypothesis that more mTORC2 activation leads to more cell migration. These findings may inform therapeutic strategies for diseases marked by pathological cell migration, such as cancer.

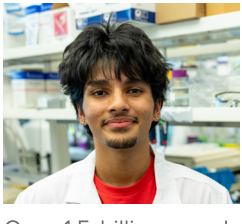


Anish Thirukumaran

Functional Analysis of miRNA at Varying Quiescence Depths

PI - Dr. Guang Yao

The functional analysis of miRNA (RNA involved in gene expression/regulation) at different quiescence depths (degrees of cellular dormancy) helps us learn about cellular aging. The longer the cells are serum starved, the deeper they go into quiescence [1]. Using HPC (high-performance computing), RStudio, and miEAA data was analyzed and graphed. Results show that the upregulated miRNAs are differentially expressed with statistical significance, and that they contribute to functions such as glucose import and focal adhesion. These findings signify that miRNA plays a crucial role in managing cell division, and if its function is impaired cells could age faster or start to uncontrollably divide and become cancerous.



Aryan Tuli

Striking the Right Chord: Cochlear Neuronal Specialization for Hearing in the Inner Ear

PI - Dr. Ebenezer Yamoah

Over 1.5 billion people internationally have some degree of hearing loss (NIH, 2024). My research studies how neurons respond to different electrical stimuli. Specifically, understanding mechanoelectrical transduction, the conversion of sound waves to electrical signals sent to the brain, can contribute to therapies that mitigate inner ear-related hearing loss. Data was collected using patch-clamp electrophysiology by enzymatically isolating neurons and applying varying stimuli, showcasing the different responses of neurons within the inner ear. Results reveal an inverse relationship between capacitance and membrane resistance and a direct relationship between current and voltage. Ion currents were also observed, with responses varying when applied to different voltage levels. The results provide insight into the different roles of neurons when transmitting complex information to the brain.

Cristián Valdéz

Silver Nanoparticle SERS Enhanced Hydrogel Sensors for Exosome Analysis

PI - Dr. Swarna Ganesh

Exosomes take on a crucial role in cancer research. Exosomes are small vesicles that transfer materials like miRNA and Proteins. Exosomes can promote the spread of cancer (Gualrezi, 2017). This project identifies and investigates the characteristics of ovarian cancer cell exosomes using SERS (surface enhanced RAMAN spectroscopy). We use 3D volumetric light printing to create a nanochip with wells to insert the exosomes into (Herder et al., 2024). We then synthesized their surface with silver nanoparticles. These particles intensify the spectra (visual graph) of the exosomes' biological characteristics and chemical structure. SERS uses a laser to reflect light off the exosomes. Based on these results, we can identify a unique fingerprint graph that could be used as a reference for future blood diagnostics.

Dhruva Vasireddy

The Impact of Noise Exposure, Sleep, and Diet on A Non-Invasive Biomarker of Human Health

PI - Dr. Jennifer Teske

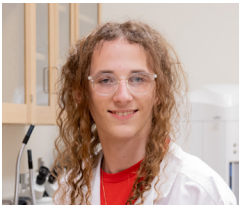
Environmental noise is a public health problem associated with many chronic physical and psychiatric diseases. This study examines the relationship between exposure to daytime noise pollution and PERK in biofluids and if this relationship is augmented by diet and sleep in young adults and to test the hypothesis that higher levels of PERK in saliva and urine will be associated with higher levels of environmental noise, sleep disturbances and indicators of an unhealthy diet as well as lower, decreased sleep quality and duration. Our hypothesis was partially accepted. The sleep and diet variables were inversely associated with PERK and environmental noise was not significantly associated. Future research should reanalyze 2022 data and better validate sleep and diet parameters to avoid the misrepresentation of data.

Maiya Virani

Mosquito Species Composition in Sites with a History of Human West Nile Virus Cases

PI - Dr. Kathleen Walker

West Nile virus (WNV) is a mosquito-borne disease carried by *Culex* mosquitos. Human cases are common in Phoenix and Tucson. The Pima County Health Department monitors mosquitoes and WNV to predict outbreak risk. Our research sought to identify which species of *Culex* are present at places with past or current human WNV cases. We collected mosquitoes at 5 sites within Tucson and identified them as *Culex tarsalis* or *Culex quinquefasciatus*. Seven pools of *Culex* spp. females were RAMP tested for WNV. All were negative. We found that *C. quinquefasciatus* is the more prominent vector in areas with history of West Nile Virus transmission. Research is ongoing but Pima County can use this data to better predict future outbreaks and plan prevention.



Allie Nikolai Wagenheim

Prior Battle Experience Doesn't Influence Future Behaviors in Temnothorax rugatulus

PI - Dr. Anna Dornhaus

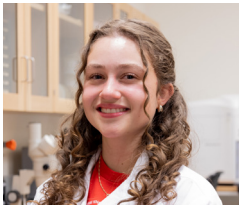
Ants fight each other and typically fight more than once in their life (1). We were interested in seeing if battle experience affects contest outcomes, since it is speculated that experience could be important in determining who wins (2). My research project investigated how battle experience impacted the success rate of an ant species named *Temnothorax rugatulus* (rock ant) in battle. I focused on whether ants altered their behavior in response to previous battle experience. We collected data by analyzing footage of their battles and interactions. There was not a statistically significant difference in the behaviors we measured, indicating experience in battle did not alter ant behavior. However, there are limitations to this research, such as the low sample size.

Shamel Wazeen Waheed

Using Quantum Algorithms to Observe Neutrino Oscillations

PI - Dr. Pooja Siwach

A supernova emits immeasurable numbers of neutrinos, which have the unique ability to oscillate between different states as they move through space and interact with each other[2]. To understand this phenomenon, we need to simulate this multiparticle problem on a computer. Among the most challenging limitations confronted by researchers studying multiparticle problems is the inability of conventional computers, which use a binary system of 0s and 1s to describe the peculiar interactions between minuscule particles[1]. In quantum computing, quantum bits (qubits) can oscillate between states of 0 and 1 to achieve the processing power necessary to simulate these problems[1]. Using a quantum simulation, I simulated the dynamics of two interacting neutrinos with high statistical accuracy, which I hope to replicate in systems involving more particles.



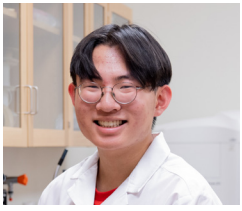
Sadah Helena Wise

Printable Granular Hydrogel Scaffolds for Fibroblast Growth

PI - Dr. Alexander McGhee

Hydrogels are crosslinked monomers that form mesh networks capable of absorbing water. Their rigidity ranges from soft to stiff, allowing them to act as tissue scaffolds that support cell growth[1]. Fibroblast cells repair and maintain tissue structure, so my project focused on identifying an ideal hydrogel rigidity for fibroblast growth and bioprinting the hydrogel constructs into custom shapes. We made soft and stiff hydrogels, broke them into tiny granules, and added chemicals to allow fibroblasts to adhere to them. The fibroblasts spread and adhered well on the stiff hydrogel but showed limited attachment on the soft hydrogel. We successfully printed a stiff hydrogel in the shape of the University of Arizona "A" logo, showing the hydrogel's future applications in tissue modeling and cancer research.

POSTER ABSTRACTS



Davis Yi

Determining *Toxoplasma gondii* Burden in Chronically Infected Mice Brains

PI - Dr. Anita Koshy

Toxoplasma gondii chronically infects up to one-third of the global population by forming dormant bradyzoite cysts within the central nervous system, where they can reactivate and cause disease in immunocompromised individuals [1]. This project aims to quantify 1% PCA infected brains vs saline brains in mice through different techniques. I used a Cre-reporter mouse model to identify host cells that had interacted with the parasite through GFP expression, providing a measure of parasite dissemination to the brain. Half-brains were sectioned (40 µm) for immunofluorescence assay [2] to quantify parasite cysts and qRT-PCR targeting the *T. gondii*-specific B1 gene to estimate parasite burden. We anticipate a dose-dependent increase in parasite burden compared with saline controls, demonstrating successful establishment of chronic CNS infection.

2026 PRINCIPAL INVESTIGATORS

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Dr. Pascale Charest
Dr. Nathan Cherrington
Dr. Jared Churko
Dr. Stephen Cowen
Dr. Anna Dornhaus
Dr. Swarna Ganesh
Dr. Teodora Georgieva
Dr. Nikolay Golubev
Dr. Philipp Gutruf
Dr. Shanna Hamilton
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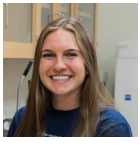

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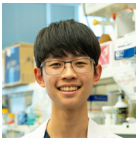
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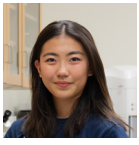
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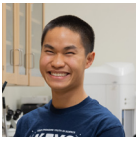
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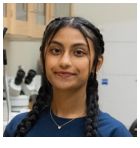
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We are also grateful to the Thomas R. Brown Foundations for their new endowment, permanently creating funding for interns in the physical sciences. This gift enables us to offer the KEYS experience to students in broader disciplines.

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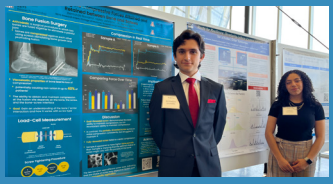

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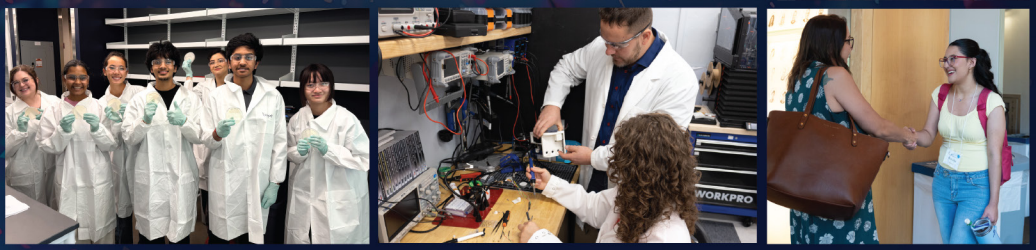

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