Department of Biology Winter Research Summit

December 12th, 2025
11:30AM - 2:00PM

Prince George's Room
Stamp Student Union

Schedule

11:30AM - Student Poster Session
12:30PM - Featured Speakers
1:00PM - Student Poster Session Resumes
2:00PM - Event Concludes

Welcome from the Chair

We are pleased to welcome you to the Department of Biology's inaugural Winter Research Summit. This event is a celebration of the innovative research conducted by our talented undergraduate and graduate students, and it serves as a platform to showcase the diverse and dynamic work happening across our department's labs.

The students featured today have been nominated by their faculty mentors for their exemplary research efforts. They represent a wide range of disciplines within the Biological Sciences. Fourteen students from ten different labs are featured here, each sharing their unique research contributions.

Our aim for this summit is to foster collaboration, encourage the exchange of ideas, and highlight the potential of our students and faculty. Thank you for joining us in celebrating their achievements and the vibrant research community within our department.

Dr. Joshua Singer, Professor and Chair of Biology

Featured Speakers

Dr. Ricardo Araneda
Professor

Dr. Alexandra Bely
Professor
Director of Biology Honors Program

Dr. Nikolas Francis
Assistant Professor
Director of Neuroscience Honors Program

The Effect of Sex on Neurogenesis in the Subventricular Zone

Latrell Cook

Abstract

Social isolation has been shown to alter adult neurogenesis in regions such as the olfactory bulb and hippocampus, which may induce changes in memory formation and olfactory processing. Here, we investigated whether social isolation impacts the rate of neural cell proliferation in the subventricular zone (SVZ) before they migrate to the olfactory bulb. In our study, male and female C57BL/6J mice were assigned to a single-housed or group-housed condition for two weeks. To label actively dividing cells, we used 5-ethynyl-2'-deoxyuridine (EdU), which incorporates into DNA, followed by immunohistochemistry. EdU-labeled (EdU+) cells were manually counted in coronal sections of the SVZ (50 μm). Three to five slices were counted per animal. Under control conditions, we observed that both male and female group-housed mice have similar numbers of total EdU+ cells in the SVZ; males, 185 ± 56, females, 168 ± 36, respectively. Furthermore, we recorded that male and female mice displayed similar EdU+ density (EdU+ cells/mm2) in the SVZ. These results indicate males and females reared in group-housed conditions exhibit comparable EdU+ cell count and density of proliferating cells in the SVZ. In ongoing experiments, we are quantifying the count and density of EdU+ cells in the socially isolated groups.

Biography

Latrell Cook is a third-year student at the University of Maryland pursuing a dual degree in Biological Sciences (Physiology and Neurobiology) and Psychology, with a minor in Humanities, Health, and Medicine. He is a MARC T34 NIH Scholar, a College Park Scholars alum, a student in the Biology Honors Program, and a Gilman Scholar. Outside of his research, Latrell is a Resident Assistant, a CMNS Peer Mentor, and the Digital Communications Chair of Omicron Delta Kappa. After undergrad, Latrell hopes to pursue a dual MPH-PhD program in Neuroscience to study the impact of stress on immune system activation in the brain, and become a scientific leader capable of informing equitable health policy decisions.

Acknowledgments

Thank you to Dr. Araneda for being an invaluable source of feedback throughout this project. Thank you to Lucy, Juan, the MARC Program, and other members of the Araneda Lab for everyone's immense support and assistance in Latrell's growth as a researcher. This work was supported by the UMD MARC Program, which is funded by NIH/NIGMS grant #5T34GM149472-02

Therapeutic differences between targeted KRAS G12C On and Off inhibitors in Non-Small Cell Lung Cancers

Ariana Covas

Abstract

KRAS is the most commonly mutated oncogene, present in approximately 20% of all cancers. It functions as a small GTPase that cycles between an inactive GDP-bound state and an active GTP-bound state. Although KRAS was long considered "undruggable," the discovery of a unique binding pocket accessible only in the inactive, GDP-bound conformation led to the development of several "KRAS-off" inhibitors, some of which are now clinically approved. More recently, "KRAS-on" inhibitors targeting the active, GTP-bound state have also emerged. However, intrinsic resistance to both classes of inhibitors remains a significant challenge, highlighting the need for combination therapeutic strategies. Combining a KRAS inhibitor with another targeted agent in the RTK/RAS pathway, such as a SOS1 inhibitor (SOS1i), can enhance efficacy and mitigate resistance. In this study, SOS1i demonstrated strong synergy when paired with a KRAS-off inhibitor, whereas this synergistic effect was lost when SOS1i was combined with a KRAS-on inhibitor. Additionally, cells harboring STK11 and KEAP1 mutations required higher overall drug concentrations, indicating increased intrinsic resistance. These findings underscore the importance of rational drug combinations in overcoming resistance, with SOS1 inhibition enhancing the activity of KRAS-off inhibitors and providing a strategic advantage where single-agent therapies are insufficient.

Biography

Ariana Covas is a senior at the University of Maryland pursuing a dual degree in Biology and Chemistry, driven by a deep interest in understanding the natural world at both molecular and systemic levels. At the Walter Reed National Military Medical Center, her work centers on developing and assessing therapeutic strategies for KRAS-driven lung cancers. Her research focuses on drug combination studies, examining how specific molecular interactions can enhance treatment effectiveness and improve clinical outcomes. In addition to her oncology research, Ariana also conducts medicinal chemical research at the University of Maryland School of Pharmacy, contributing to projects aimed at designing and evaluating novel compounds with therapeutic potential towards alcohol-use disorders. Outside of research, she has worked as a campus GSS leader for Organic Chemistry since her freshman year and volunteers at local hospice centers, supporting patients and families in the community. Ariana plans to continue her research during her gap year after graduation before applying to graduate school.

Acknowledgments

Thank you to the UMD Biology Honors Program and the Kortum Lab at WRNMMC for their continued support and mentorship.

Developmental Switches in Parent-Offspring Interaction in a Cichlid Fish

William Finch

Abstract

Interactive behaviors between a parent and offspring vary across development. Cichlid fish are powerful models to study parenting behavior due to their evolutionarily diverse parental systems and genetic tractability. In Astatotilapia burtoni, females exhibit an extreme form of parenting where females hold developing eggs in their mouths for weeks without food, termed mouthbrooding. Previous work has defined A. burtoni parenting in two stages - brooding then protecting - after which females cease parental behavior and may prey on their offspring (infantacide). We aim to determine the temporal boundaries between stages and evaluate whether parental stage mediates offspring (fry) behavior. In our first experiment we monitored isolated mouthbrooders, revealing that fry are first released at 15 days of age, last released at 17-18, and the onset of infantacide is 22-23. In our second experiment, we test if fry will seek or avoid their mother across these parental stages, and if they prefer their mother over a male A. burtoni. Our results indicate that fry prefer their mother until 16 days of age then shift to avoidance (n = 46 trials), and fry do not prefer their mother over a male (n = 8 trials). We conclude that fry seek an adult figure during the brooding stage, but do not distinguish their mother from a predatory male. Further research will test the sensory basis of fry preference behavior, and how parental deprivation affects preference behavior and neural gene expression.

Biography

William is a senior Cell Biology and Genetics Major in the Biology departmental honors program. He has been an Undergraduate Research Assistant at the Juntti Lab since February 2024, and will defend his Honors thesis in May 2026. After graduation, William plans to work at a research institution before pursuing a PhD in molecular biology.

Acknowledgments

William would like to thank his mentor Dr. Coltan G. Parker, principal investigator Dr. Scott A. Juntti, and the whole Juntti Lab for their guidance and support of his research. In addition, William would also like to thank Dr. Alexandra E. Bely, director of the Biology Honors Program, for her enthusiastic instruction on the fundamentals of biological research. This research was supported through grants from the NIH (R35GM142872), NSF (DBI-2209257) and the Honors College Research Grant. Lastly, William thanks his family for their support of his undergraduate education and encouragement of his research pursuits.

Development of a Novel Hydrogel for Ethanol Ablation of Low-Grade Cervical Dysplasia

Erela Imanoel

Abstract

Cervical cancer is the leading cause of death among women in 42 low-and-middle income countries (LMICs), demonstrating a significant health disparity.[1] These regions' limited infrastructure and healthcare resources necessitate treatments which are accessible, affordable, easy to produce and administer, viable for lesions up to 5cm in diameter, and meet "screen and treat" guidelines by requiring no specialized equipment, being portable.[3] Ethanol ablation, which induces necrosis via protein denaturation and cytoplasmic dehydration, has shown potential in these areas. Previous work developed ethyl cellulose-ethanol injections that cause cancerous cell death over 5mm into the cervical stroma and thus are unduly aggressive for low-grade dysplasia, which is limited to the superficial epithelium (1–3 mm depth).[5] Here, we developed a topical gel delivery system that induces cell death in superficial cervical low-grade dysplasia without damaging healthy surrounding tissue. Various gellants, including Methyl cellulose (MC), ethyl cellulose (EC), and pluronic F-127, were investigated to develop a gel which met parameters for accessibility, ethanol retention and release, and rheological properties of a gel to enable controlled local cell kill. Pluronic F-127 failed to gel with ethanol, while EC and MC produced stable gels. EC formulations failed to maintain these gel properties at body temperature, while MC was able to, making MC gels the most suitable. The final developed gel formulation of 70% ethanol, 10% water, and 20% methyl cellulose demonstrated optimal rheological properties with: storage modulus (G') significantly greater than a loss modulus (G"), a time-dependent viscoelastic response under applied shear which shows a yield stress, and was qualitatively able to hold its weight while remaining spreadable; all properties of an ideal gel. Therapeutic efficacy studies were performed using monolayer cultures of human cervical carcinoma cells (SiHa), to quantify cytotoxic efficiency and dose response. The 70% gel formulation achieved complete SiHa cell death within 5 minutes of application, demonstrating rapid and potent cytotoxicity. In contrast, formulations containing 25% and 50% ethanol produced markedly lower levels of cell kill, confirming a clear concentration-dependent response. Among the gel conditions tested, the 70% ethanol–MC gel produced the greatest cytotoxic effect in the application area, achieving complete cell death compared to untreated controls, while containing necrosis to the treated region. This controlled ethanol diffusion and localized ablation indicates suitability for safe, targeted treatment of cervical lesions. This topically applied gel offers a simple, affordable, and effective approach for localized ethanol ablation of cervical dysplastic lesions in low-resource settings.

Biography

Erela Imanoel is a senior undergraduate student studying Cell Biology and Genetics at the University of Maryland. Currently, she conducts research in the Maisel Lab in the Department of Bioengineering as part of the Biology Departmental Honors Program. Her research focuses on the development of a novel hydrogel for treating low grade cervical dysplasia in low and middle income countries. Following her graduation in Spring 2026, she intends to attend medical school and pursue a career as a physician.

Acknowledgments

Thank you to Dr. Katharina Maisel, Ashleigh Jankowski and the entire Maisel lab. We would like to thank the UMD Fischell Department of Bioengineering BioWorkshop core facilities and the following funding sources: NSF GRFP DGE 2236417 (AMJ)

Altered odor-mediated social behavior in a model of Fragile X Syndrome

Lucy Irvine

Abstract

Fragile X Syndrome (FXS) is a neurodevelopmental disorder associated with intellectual disability. The olfactory bulb, particularly the accessory olfactory bulb (AOB), processes chemical cues that influence social and sexual behaviors. Fragile X Messenger Ribonucleoprotein (FMRP), which is absent in FXS, is highly expressed in the olfactory bulb during neuro development. Previous neuroanatomical analysis showed that the glomerular layer volume in the anterior region of the AOB was smaller in Fmr1 KO mice, a model of FXS, compared to WT mice. Here, we show that male Fmr1 KO mice show reduced investigation of conspecifics and social odors, as well as impaired discrimination between social odors. However, discrimination of non-social odors was not impaired neither was the overall motor activity. Together, these findings suggest that disruption in AOB signaling can explain the lesser sociability of these mice. Accordingly, we found that mitral cells (MCs), projection neurons of the AOB, exhibit altered excitability in Fmr1 KO mice. The firing in MCs, elicited by current stimuli, was lower in Fmr1 KO mice. In conclusion, the anatomy and physiological differences in the AOB of the Fmr1 KO mouse could partly explain their deficit in odor-mediated social behavior.

Biography

Lucy is a graduate student in the BISI Physiological systems program. Born and raised in Belgium, she obtained her BSc in Neuroscience from Keele University in the UK before working as a clinical trials coordinator in cancer research for a couple of years. Lucy joined the Araneda Lab at UMD in 2022, and she is now studying social behavior and experience-dependent plasticity in the olfactory bulb.

Acknowledgments

Marcela Navarrete, Joaquín De la Rosa, Juan Zegers, Ricardo C. Araneda, Alexia Nunez-Parra,
Jorge Mpodozis M. This study was funded by the National Agency for Research and Development (ANID) / Scholarship Program / DOCTORADO NACIONAL/2020 – 21200657 and Project FONDECYT Regular 1210069.

Spike sorting analysis of excitatory vs. inhibitory activity in HD-MEA-cultured cortical neurons

Aditi Kulkarni

Abstract

Glutamate decarboxylase 67 (GAD67) is an enzyme that catalyzes the production of gamma-aminobutyric acid (GABA), an inhibitory neurotransmitter that works together with glutamate to control synaptic function throughout the brain. This is especially important in the cerebral cortex, as cortical neurons require precise inhibitory control to prevent neuronal hyperactivity. By labeling neuronal cultures with a GAD67 antibody, we can differentiate glutamatergic neurons from GABAergic neurons. In this experiment, we analyze raw burst firing patterns of inhibitory and excitatory neurons, mapped with GAD67, and compare them to spike-sorted firing patterns to differentiate overlapping signals from various neurons in specific channels. From this, we determine spike frequency differences between inhibitory and excitatory neurons.

Biography

Aditi is completing a Dual Degree in Neuroscience and Data Science, with a strong interest in using computational tools to answer questions about the brain. Her research experience spans neural signal analysis, spike sorting, and building data pipelines for neuroimaging and electrophysiology. She is particularly excited about combining data-driven methods with neuroscience to uncover patterns that support both scientific discovery and real-world applications. Aditi hopes to pursue a research-oriented career that combines data science and neuroscience to address complex questions about brain function. Outside of her coursework, she is involved in projects that bridge analytics, technology, and neuroscience education.

Acknowledgments

I would like to thank Dr. Araneda, my faculty mentor, and the Araneda Lab for their guidance and support throughout my research journey. I would also like to thank the Neuroscience department that provided the resources and environment that made this work

The Effects Of Social Isolation On Behavior and Neurogenesis In The Olfactory Bulb Of Juvenile Male Mice

Kiyana N'Gouemo

Abstract

Since childhood, social interaction plays a vital role in shaping our behavior through brain plasticity. However, the effects of social isolation on behavior and brain plasticity haven't been sufficiently explored. Thus, this study investigates the effect of social isolation in odor mediated behaviors and odor processing circuits in the olfactory bulb (OB), where early odor processing occurs. Olfactory circuits in the OB exhibit extraordinary plasticity as they exhibit continuous adult neurogenesis (Nunez-Parra et al., 2011). Here, we will examine the behavioral differences and neurogenesis in animals maintained in different housing conditions; group-housed (GH) and single-housed (SH) mice. For behavior, we used the resident intruder paradigm as a model to measure the sniffing behavior of social odors by the intruder mouse pre/post-encounter with the resident mouse (Koolhaas et al, 2011). We found that group-housed (GH) male mice show significant avoidance of the bedding of the resident post-encounter. In contrast, the socially isolated (SH) male mice showed no avoidance of the bedding. To rule out anxiety as a factor in this behavior, we used a Light-Dark box, which resulted in both GH and SH mice having the same observed time spent in each zone of the box, indicating that they do not differ in the expression of anxiety. For neurogenesis, we used immunohistochemistry for Ethynyl DeoxyUridine (EdU). This technique incorporates a thymine analog into dividing cells, which we then label using cy5 via a copper-catalyzed reaction. We found that the isolation of c57 male mice reduces the amount of newly born neurons in the main OB. Thus, from these experiments, we gathered that social isolation differs between behaviors and affects neurogenesis differently.

Biography

Kiyana N'Gouemo is a senior Neuroscience student and Global Public Health Scholar at the University of Maryland, College Park. She plans to pursue an MD with the hopes of working in a pediatric neuro-related specialty. Her long-term goal is to integrate clinical practice with neuroscience research, particularly in the area of neurodegenerative diseases. Kiyana is passionate about improving neurological health outcomes and hopes to contribute to research that advances care for diverse and underserved communities.

Acknowledgments

Thank you to Dr. Araneda for the invaluable guidance and support throughout this project. I am also grateful to Lucy and Juan for their mentorship, encouragement, and for helping me strengthen my laboratory skills while deepening my understanding of neuroscience research. Finally, thank you to all members of the Araneda Lab for their continued support!

Intrinsic light sensitivity regulates ipRGC axon targeting during visual system development

Rebbeca Pomerat

Abstract

Intrinsically photosensitive retinal ganglion cells (ipRGCs) play a central role in non–image-forming vision by conveying light information to retinorecipient targets such as the suprachiasmatic nucleus (SCN) and dorsal lateral geniculate nucleus (dLGN). ipRGCs express the photopigment melanopsin and co-release the neuropeptide pituitary adenylate cyclase-activating polypeptide (PACAP), both of which are important for sensitivity to light in the adult brain. However, developmental roles for these signaling molecules in ipRGC circuit refinement remain unclear. Using dual-eye fluorescent tract tracing, ipRGC projections to the SCN and dLGN were quantified in melanopsin knockout (Opn4-KO) and ipRGC-specific PACAP conditional knockout (PACAP-cKO) mice. Two-dimensional intensity analyses revealed that loss of melanopsin results in asymmetrical ipRGC innervation of the SCN before eye-opening (P8) with a significant contralateral bias compared with wild-type controls. In contrast, PACAP-cKO mice exhibit normal bilateral SCN innervation compared to controls. Within the dLGN, Opn4-KO mice showed impaired eye-specific segregation at P8, an effect also seen in PACAP-cKO mice. To measure axon branching defects at the single cell level in future work, we generated a new TIGRE-MORF x Opn4cre(DSO) mouse line that drives spare fluorescent labeling of individual ipRGCs in the retina and their axon projections in the brain. Together, these findings show that both melanopsin-driven intrinsic photosensitivity and PACAP signaling are essential for the proper development of retinofugal projections, with differential impacts in specific target nuclei.

Biography

Rebbeca Pomerat is a senior undergraduate neuroscience major focusing on the Molecular, Cellular and Physiological Track. As a member of the Neuroscience Honors Program, she is completing her undergraduate thesis in the Speer Lab under the mentorship of Dr. Colenso M. Speer. Her research examines the roles of melanopsin and pituitary adenylate cyclase-activating polypeptide (PACAP) in the axonal development of intrinsically photosensitive retinal ganglion cells (ipRGCs) and their projections to retinorecipient targets in the brain. Following graduation, she plans to attend a post-baccalaureate program to further develop her research skills before pursuing a Ph.D. in neuroscience, biochemistry, or molecular and cellular biology. Her long-term goal is to study neurodegenerative and neurodevelopmental disorders or visual circuit development.

Acknowledgments

This work was conducted in the Speer Lab under the mentorship of Dr. Colenso M. Speer. She gives thanks the lab members, especially Dr. César J. Hernández for his guidance and assistance with imaging, data analysis, and experimental design. Imaging was supported by the University of Maryland Imaging Core and purchase of the Leica Stellaris 8 was supported by Award Number 1S10ODO34260 from the National Institute of Health. This work was funded by the National Institutes of Health (DP2MH125812 to Colenso M. Speer).

Reducing Off-Target Effects of Viral Ablation to Study Corticocollicular Contributions to Auditory Perceptual Learning

Asbah Qadri

Abstract

Plasticity across both cortical and subcortical auditory structures may underlie auditory perceptual learning, the ability to improve detection of subtle sound features through practice. Descending corticocollicular (CC) projections from the auditory cortex (ACx) to the inferior colliculus (IC) are well positioned to modulate subcortical processing during learning, but their causal role remains unclear. Previous attempts to test the necessity of CC neurons by ablating them used a retrograde Cre-GFP (rCre-GFP) virus in the IC paired with Cre-dependent caspase in the ACx. Although behavioral performance was impaired, subsequent histology revealed that rCre-GFP produced nonspecific neurotoxicity in the IC, making it unclear whether learning deficits were caused by CC ablation, by cell death in the IC, or both. To address this, we tested whether diluting rCre-GFP would reduce IC neurotoxicity and result in a similar behavioral deficit. Mongolian gerbils received injections of either full-strength or diluted retrograde Cre in the IC paired with saline or caspase in the ACx, or saline injections in the IC as a control. Subjects were trained on a sound-detection task and AM-detection thresholds were tracked over ten days of perceptual training. Animals injected with full-strength rCre-GFP and diluted rCre-GFP both showed an improvement in learning, and diluted rCre-GFP's improvement significantly better than in the full-strength rCre-GFP group. Moreover, learning in the diluted rCre-GFP group was not significantly different from saline-only IC controls, indicating that dilution may effectively mitigate the behavioral impact of IC neurotoxicity. These findings demonstrate that dilution of retrograde Cre-GFP virus preserves IC integrity, and prevents learning deficits due to off-target cell death, allowing future experiments to investigate the causal role of corticocollicular projections in auditory perceptual learning without this confound.

Biography

Asbah is a senior studying Neuroscience and Public Health Science in Dr. Melissa Caras's lab. She is working on a project examining the role of subcortical projections from the auditory cortex in auditory perceptual learning. She hopes to pursue a career in neuroscience-related research with an interest in connecting circuit-level mechanisms to clinical applications for neurological disorders.

Acknowledgments

Asbah would like to thank everyone in the Caras lab for their support.

Exploring the Relationship between Muscle Cell Area and Weight in Rainbow Trout

Akash Raghu

Abstract

Muscle yield in Rainbow Trout is an important and marketable trait. Cell size and count have been proven to influence body size, a process precisely regulated by genes linked to growth and nutritional factors. We hypothesized that phenotypic divergence between USDA NCCCWA selectively bred high and low fillet yield genetic lines can be explained in part by increased muscle cell size and count. Our investigation found that there was a significant correlation between both cellular filled area and several economically relevant traits, including body weight, muscle weight, visceral weight, and body length. A multi-omics approach including the transcriptome interrogation, microbiome analysis and genome wide association studies allowed us to correlate gene expression signatures, single nucleotide polymorphisms and idiosyncratic bacterial features explaining phenotypic variability. Transcriptome interrogation revealed associations of autophagic and catabolic mechanisms to increased cell size. Homeostatic and developmental pathways were also noted as upregulated in high filled area individuals. In contrast, muscle contractile pathways were noted as downregulated, a phenomenon that may be explained by the interplay of environmental conditions.

Biography

Akash Raghu is a senior at the University of Maryland studying Neurobiology and Physiology with a minor in General Business. His primary research focuses on muscle biology in salmonid species, where he uses genomics, microscopy, and histology to investigate muscle development and gene expression. He also conducts clinical neuroscience research on cerebral edema and intraventricular hemorrhage at the University of Maryland Medical Center, with a project accepted for presentation at the 2026 International Stroke Conference, and previously studied translational control mechanisms at the NIH's NICHD.

In addition to his research, Akash has extensive clinical experience in primary care, gastroenterology, and community health. After graduating, he plans to pursue an NIH postbaccalaureate research fellowship during his gap year before applying to medical school.

Acknowledgments

Special thanks to the Department of Animal and Avian Sciences, USDA National Center for Cool and Cold-Water Aquaculture, and Biology Honors Program.

Development of a Chronic Laminar Electrophysiology Approach in the Freely Moving, Behaving, Mongolian Gerbil

Marissa Janesse Renee

Abstract

With practice we can learn to detect or discriminate previously imperceivable stimuli, a phenomenon known as perceptual learning. Current understanding of the neural mechanisms underlying auditory perceptual learning in the auditory cortex is mostly derived from single unit extracellular electrophysiology from L2/3. A majority of our understanding of the laminar circuits involved in sound processing are derived from anesthetized or head-fixed animals. Translaminar recordings from the auditory cortex of freely-moving and behaving animals have sparsely been described, likely due to technical difficulties associated with the lateral position of the auditory cortex. To overcome this technical barrier a chronic, free floating, preparation for laminar electrophysiology in the freely moving Mongolian gerbil was developed. This technique was applied to study neural plasticity across cortical layers during perceptual learning of an amplitude-modulated signal-in-noise detection task.

Beyond the current study, this technique is an exciting advancement, providing new opportunities for understanding circuit level dynamics of cortical processing. Recording quality has been stable for 10+ weeks with data collection continuously ongoing.

Biography

Marissa is a second year PhD student in Melissa Caras's lab in the Neuroscience and Cognitive Science (NACS) Program. Her current project examines laminar dynamics in the auditory cortex of freely moving animals during perceptual learning. Marissa's overarching research interests include: the underlying mechanisms of how inhibitory and exhibitory balance contribute to sensory guided behavior, genetic and cellular mechanisms underlying perceptual learning, and the role of top-down modulation on sensory perception.

Acknowledgments

This work was supported in part by training grant DC-00046 from the National Institute of Deafness and Communicative Disorders of the National Institutes of Health.

Serotonergic Modulation of Habituation and Associative Learning in Mice

Janasia Thomas

Abstract

Psychedelic drugs are frequently used in therapy-related scenarios where they can have a long-term effect on mood and psychiatric issues such as depression and anxiety. Psychedelics are also used in relation to hearing, because they can influence perception of auditory stimuli. 2,5-Dimethoxy-4-iodoamphetamine, also known as DOI, is a psychedelic drug with effects on associative learning. In this experiment, ketanserin and saline are used as well. Ketanserin specifically is an antagonist and it's believed to block the effects of the agonist DOI. Saline is used as a control to compare results amongst the different drugs. To investigate, we studied the effects of the serotonergic psychedelic drug, DOI, to assess its effects on habituation and associative learning during pre-pulse inhibition (PPI) of the acoustic startle response (ASR) in mice. ASR is a phenomenon where mice jump when exposed to a sudden stimulus. PPI is when a 'warning noise' will be played to prime the mice for a sudden, loud noise. Effects of ketanserin and saline during PPI and ASR were studied as well. The data showed that the dosage of DOI did not contribute to differences in ASR or PPI. Additionally, DOI correlates with a lower startle response with higher ISI's, indicating associative learning and habituation. Ketanserin temporarily blocked habituation during two sessions, but others remained the same. In the saline sessions, habituation was shown. From these results, we can conclude that DOI may improve associative learning indicated by the changes in PPI with long ISI's. Additionally, in the future, this experiment can be redone with a larger batch of mice to ensure that the results are accurate.

Biography

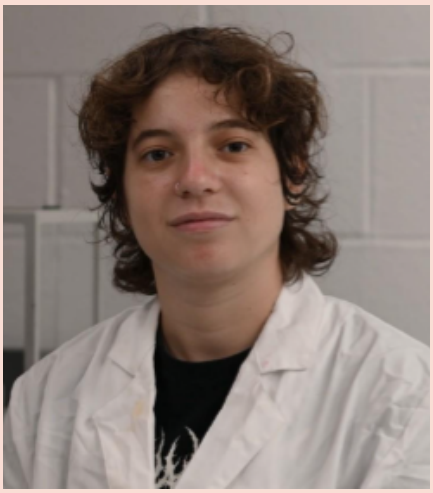
Janasia Thomas is a third-year undergraduate student studying Neuroscience. Her primary research focus is looking at auditory processing in mice. After completing a bachelor's degree, Janasia plans to pursue an MD/PhD. Outside of research, she is actively involved on campus through the OMSE Academic Excellence Society as the Vice President of Public Relations. She is also a proud member of Zeta Phi Beta Sorority, Incorporated.

Acknowledgments

Nikolas A. Francis, Sarah Vaughn, Jason Putnam

De-novo sequencing and phylogenetic categorization of a Microbacterium species from the Rainbow Trout Gut Microbiome

Lindsey Walter



Abstract

In order to fully understand the gut microbiome of the rainbow trout, each species present must be fully evaluated, with its biochemical pathways fully examined. With many of the identified bacteria in the microbiome being unidentified or generally understudied, we worked to isolate bacteria from the trout gut in order to solve this problem. To isolate bacteria, we incubated fecal matter in m9 media, and then spread and grew the broth on Ty plates. From there, we selected individual colonies and grew them out in Ty broth, extracting DNA from the species once they had grown sufficiently. During our experiment, we discovered a Microbacterium species that, upon further investigation, showed a variety of biologically important and relevant pathways. These pathways code for metabolites such as lipoic acid and pyridoxal-P, which are important fatty acids and vitamins, and therefore need to be further analyzed.

Biography

Lindsey Walter is a third-year undergraduate student researcher in the Salem Lab studying the bacterial species of the trout gut microbiome. A bachelor's degree in microbiology is expected in May 2027. They are a part of the Integrated Life Sciences Honors College as well as the Biological Sciences Departmental Honors Programs.

Acknowledgments

They would like to acknowledge Dr. Mohamed Salem, as well as Guglielmo Raymo for their parts in assisting with this project as well as their mentorship in the lab. Additionally, they would like to thank the Department of Animal and Avian Sciences for supporting the lab as well as Plasmidsaurus for their work in sequencing the genome of the species of interest.

Conservation and Divergence on the Neo-Ys of Brugia and Wuchereria Filarial Nematodes

Kevin Zhou-Hackbarth

Abstract

Most described nematodes, including the ancestor of filarial nematodes, have XX/XO systems, in which females have two X chromosomes and males have a single X chromosome. The evolution of X chromosomes and sex determination has been extensively studied in free-living nematodes. However, due to the rarity of nematode Y chromosomes, there has been no genomic comparisons between homologous degenerate Y chromosomes in nematodes to date. In the ancestor of the genera Brugia and Wuchereria, which include the causes of lymphatic filariasis in humans, an autosome fused with the ancestral X chromosome. The resulting neo-X chromosome is comprised of the ancestral X chromosome and the formerly autosomal X-added region (XAR). The homolog of the XAR pairs in opposition to the neo-X during meiosis and is thus inherited in a male-limited manner as a neo-Y chromosome. Neo-Y-linked contigs have been identified for B. malayi, but the gene-poor, repeat-rich nature of the neo-Y has prevented their full assembly. Here we present the identification of neo-Y-linked genomic sequences in Wuchereria bancrofti and compare them with B. malayi.

Biography

Kevin Zhou-Hackbarth is a fifth-year student in the BISI-CBBG program in the Haag and Dunning Hotopp labs, studying the evolution and genomes of parasitic nematodes. Outside of lab, Kevin enjoys studying languages, improv, and getting attacked by his cat Violet.

Acknowledgments

Kevin gives thanks to the members of the Haag, Dunning Hotopp, and Bely labs, past and present.
He thanks the National Science Foundation (IOS-1755379) and the National Institute of Allergy and Infectious Diseases (U19AI110820) and the Drs. Wayne T. and Mary T. Hockmeyer Fellowship for funding.

Department of Biology Winter Research Summit

The Department gives special thanks to those involved with planning and hosting this event:

Tseday Solomon
Dr. Kim Paczolt
Kordell Harper
Samar Ata
Steven Kuba