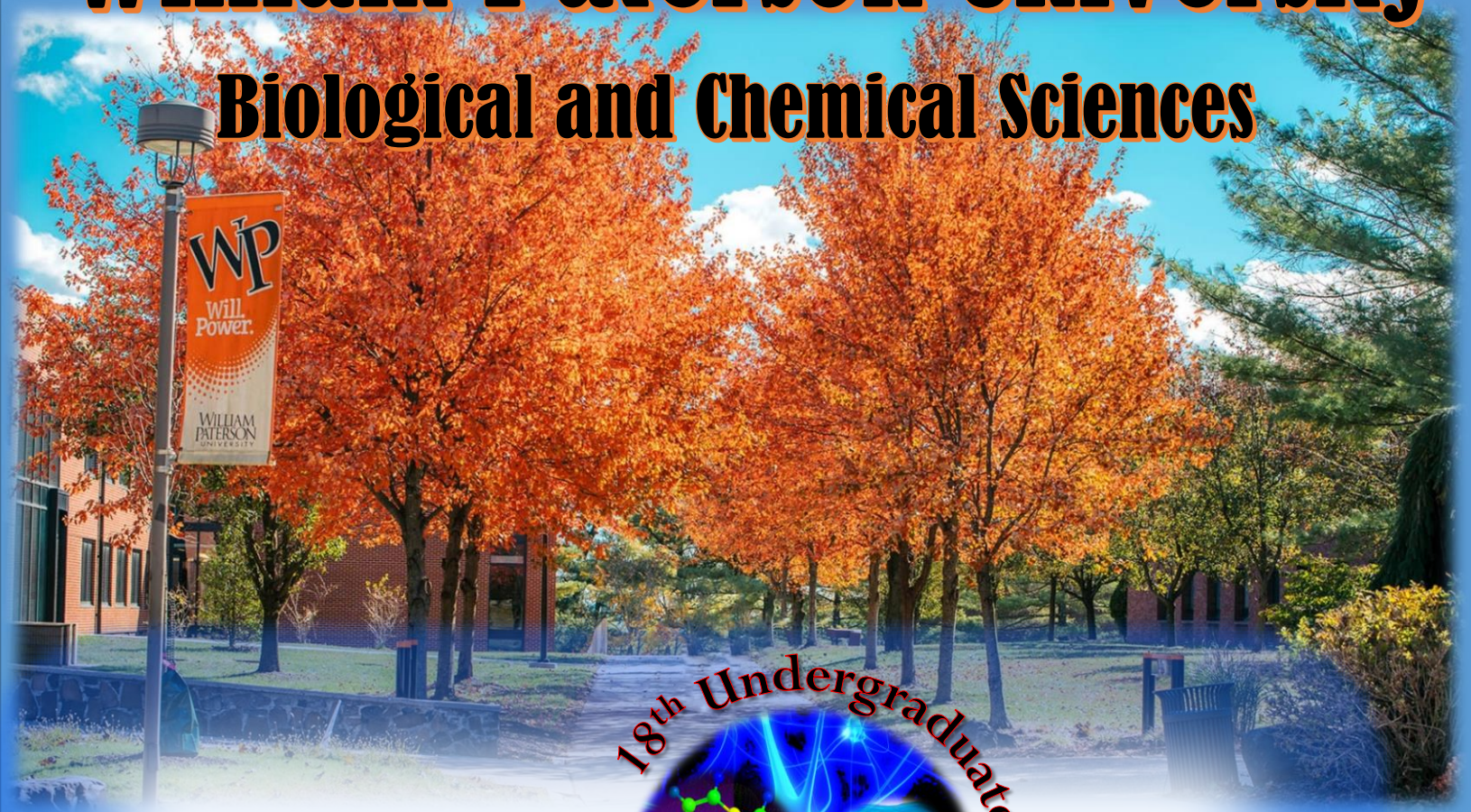
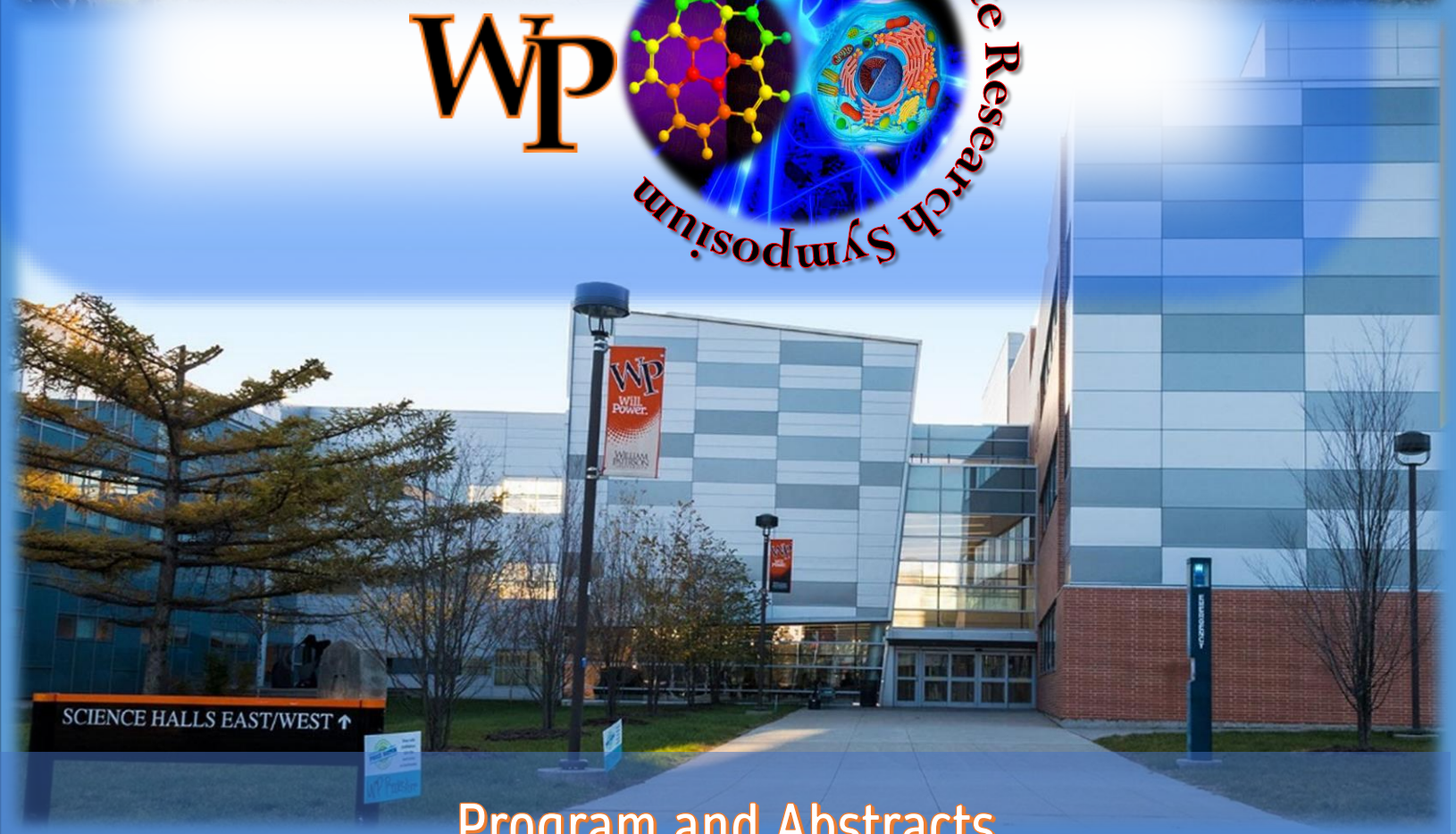
William Paterson University

Biological and Chemical Sciences



WP

18th Undergraduate Research Symposium



Program and Abstracts

Saturday, April 12th, 2025

Table of Contents

"Few Words From Organizers"

Few activities are as rewarding as research to the motivated students as well as faculty mentors. In addition to the acquisition of invaluable research skills, students learn how knowledge is created and experience the excitement of the "eureka moment". To celebrate undergraduate achievements, a research symposium has been held since 2007 on the WPUNJ campus for students in biological, chemical and environmental sciences. This symposium provides an opportunity to the students to showcase their talents and share their research achievements with their peers from about 16 universities from the tristate area.

We would like to welcome all of you to an exciting 18th year of the Undergraduate Research Symposium at William Paterson University of New Jersey. This is an example of a budding community of undergraduate researchers. We want to thank all the students from past and present who participated in the symposium and shared their research with us. We also want to thank all the research mentors who have made it possible by investing their time, knowledge, resources and energy, so that the undergraduates gain their first-hand research experiences.

We express our gratitude to all our student volunteers who show great enthusiasm and worked very hard to make this symposium a success.

We are very much obliged to Professor Virginia Cornish for accepting our invitation as our keynote speaker and investing her valuable time to be with us.

This symposium could not have been successful without the moral and continuous support from our Dean, Dr. Sharma, and Associate Dean, Dr. Zeleke, who worked very diligently with us so that everything is put together in a professional manner.

We also want to thank Dr. Michael Peek and Dr. Bhanu P. S. Chauhan, (Chairs of the Biology and Chemistry Departments) for their continued support. As well as the Office of Institutional Advancement and the Alumni Association for contributing financially to the event in various capacities.

Finally, we extend our gratitude to Provost Joshua Powers and President Richard Helldobler for their leadership and encouragement to make this symposium a great success.

ORGANIZERS:

Dr. Emily Monroe

Dr. Bhanu P. S. Chauhan

About Plenary Speaker

Professor Virginia Cornish

Columbia University, Department of Chemistry and Systems Biology, New York

Virginia W. Cornish is the Helena Rubinstein Chair in the Department of Chemistry and a founding member of the Department of Systems Biology at Columbia University. Her research brings together modern methods in synthetic chemistry and DNA technology to expand the synthetic capabilities of living cells, and she is a pioneer in the field of yeast synthetic biology. Her current research focuses on translating state of-the-art synthetic biology platforms to the clinic.

Professor Cornish has over 100 research publications and issued patents and has been supported by grants from the NIH, NSF, DARPA, USDA and numerous private

foundations. Virginia has been recognized by an NSF Career Award (2000), a Sloan Foundation Fellowship (2003), the Columbia College John Jay Award (2005), the Protein Society Irving Sigal Young Investigator Award (2009), the American Chemical Society Pfizer Award in Enzyme Chemistry (2009), and an HHMI Gilliam Adviser (2021).

Professor Cornish graduated summa cum laude from Columbia University with a B.A. in Biochemistry in 1991, where she did undergraduate research with Professor Ronald Breslow. She earned her Ph.D. in Chemistry with Professor Peter Schultz at the University of California at Berkeley and then was a Postdoctoral Fellow in the Biology Department at M.I.T. under the guidance of Professor Robert Sauer. Virginia joined the faculty of the Chemistry Department at Columbia in 1999 and was promoted Associate Professor with tenure in 2004, Professor in 2007, and Helena Rubinstein Chair in 2011.

PLENARY ABSTRACT

"EXPANDING THE SYNTHETIC CAPABILITIES OF YEAST"

In vitro directed evolution allows biomolecules with new and useful properties to be engineered—mimicking natural evolution on an experimentally accessible time scale by creating large libraries of DNA mutants using PCR and then carrying out a high-throughput assay for variants with improved function. To provide a breakthrough in the complexity of libraries that can be readily searched experimentally for synthetic biology and to allow systems to be directly engineered in the cell, my laboratory is engineering *S. cerevisiae* so that both the mutagenesis and selection steps of directed evolution can be carried out entirely *in vivo*, under conditions of sexual reproduction. We have built a modular chemical complementation assay, which provides a selection for diverse chemistry beyond that natural to the cell using themes and variations on the yeast two-hybrid assay. In addition, we devised a heritable recombination system, for simultaneous mutagenesis and selection *in vivo* under conditions of sexual reproduction. Finally, we have begun to utilize these mutagenesis and selection technologies to engineer yeast to carry out new functions themselves ranging from being a biosensor, to a therapeutic, to a self-organizing community.

SYMPOSIUM ORGANIZAING COMMITTEE

ORGANIZERS

Dr. Emily Monroe

Dr. Bhanu P. S. Chauhan

Committee Members

Ms. Karyn Lapadura

Dr. Nishikant Satam

Dr. Mukesh Sahni

Dr. Carey Waldburger

SCHEDULE OF EVENTS

8: am– 9:00 am	**Registration, Breakfast, & Poster Setup** **University Commons 171 A/B**
9:00 am – 9:30 am	Welcome and Opening Remarks Provost Joshua Powers Ballroom
9:30 am – 11:30 am	POSTER SESSION A, Ballroom Cell & Molecular Biology & Genetics I: CMB 1 – CMB 6 and 13 Physiology, Behavior & Toxicology I: PBT 1 – PBT 11 Biochemisyry: BC 1 – BC 8 Nanochemistry: NC 1 – NC 7 Organic Chemistry: OC 1 – OC 8
11:30 am –12:45 pm	LUNCH – Wayne Dining Hall
1:00 pm – 2:00 pm	PLENARY TALK - Ballroom Professor Virginia Cornish Helena Rubinstein Chair in the Department of Chemistry and Professor in the Department of Systems Biology Columbia University "Expanding the Synthetic Capabilities of Yeast"
2:15 pm – 4:15 pm	POSTER SESSION B , Ballroom Cell & Molecular Biology II: CMB 7 - CMB 12 Ecology, & Environmental Science II: EEE 1 – EEE 11 Physiology, Behavior & Toxicology II: PBT 12 – PBT 23 Materials Chemistry: MC 1 – MC 8 Analytical Chemistry: AC 1 – AC 9
4:15 - 5:00 pm	Light Refreshments
5:00 – 5:30 pm	Awards Ceremony

Poster Session A: Cell & Molecular Biology I

JUDGES: Dr. Kyle Murphy*
Dr. Joseph Agugliaro

Poster#	Title, Author(s), Affiliation(s)	Page#
CMB 1	**CLONING AND OVEREXPRESSION OF A *KARENIA BREVIS* CASPASE-3-LIKE GENE IN *E. COLI* USING AN ALTERNATE START CODON** ***Antonio Guarino*[1]** and Dr. Emily A. Monroe[1]; [1]Department of Biology, William Paterson University, Wayne, NJ	26
CMB 2	**AN RNAi SCREEN TO IDENTIFY CELL MIGRATION REGULATORS IN *C. elegans*.** ***Johnna Mainhart***, and Dr. Andre Wallace; Department of Biological Sciences, Fairleigh Dickinson University, Teaneck, NJ	27
CMB 3	**PLMVD AND CIRCULAR RNA** ***Anahi Menendez***, Dr. Ouellet; Department of Chemistry, Monmouth University, West Long Branch, NJ	28
CMB 4	**THE ROLE OF MITOCHONDRIAL FUNCTION AND INCREASED GLUTAMINOLYSIS IN THE CONTEXT OF PINK1** ***Melissa Misurelli*** Dr. Ansu Perekatt and Shima Nejati Schaefer School of Engineering & Science Department of Chemistry and Chemical Biology (CCB) Stevens Institute of Technology, Hoboken, NJ	29
CMB 5	**THE CELL WALL INTEGRITY PATHWAY AND *SLT2* ARE REQUIRED FOR *FKS2*-MEDIATED ECHINOCANDIN RESISTANCE IN THE OPPORTUNISTIC FUNGAL PATHOGEN *CANDIDA GLABRATA***	30

	Zubayeda Uddin[1], Saira Tahsin[1], Klara Valickova[1], Tengfei Long[2], Laura Fruhauf De Macedo[1], Gabrielle Popencuk[1], Dr. Yanan Zhao[2], Dr. Kelley R. Healey[1] [1]Department of Biology, William Paterson University, Wayne, NJ [2]School of Pharmacy and [2]Pharmaceutical Sciences, University at Buffalo, Buffalo, NY	
CMB 6	**INVESTIGATING THE EXPRESSION AND REGULATION OF THE *MRP* GENE CLUSTER IN THE MARINE BACTERIUM *MARINOBACTER ADHAERENS*** ***Isabella Westervelt*** and Dr. Carey Waldburger Department of Biology, William Paterson University of New Jersey, Wayne, NJ	31
CMB 13	**CANCER'S WEAK SPOT: HACKING TUMOR METABOLISM TO STARVE CANCER CELLS – A NOVEL APPROACH TO CANCER THERAPY** ***Sadikshya Koirala*** and Dr. Eduardo Zappi; Department of Natural Sciences, Caldwell University, Caldwell, NJ	32

***Coordinator**

Poster Session A: Physiology, Behavior and Toxicology I

JUDGES: Dr. Slaymaker*
Dr. Edith Myers
Dr. Melissa Ingala

Poster#	Title, Author(s), Affiliation(s)	Page#
PBT 1	**GLUTEN- AND CASEIN-DERIVED PEPTIDES PROMOTE MICROGLIAL ACTIVATION AND INFLAMMATORY RESPONSES: IMPLICATIONS FOR ASD BEHAVIORS** ***Nahal Ahmed, Marina Botros*** and Dr. Lorelei Pratt School of Natural Sciences Caldwell University, Caldwell, NJ	33
PBT 2	**THE EFFECTS OF POLYAMIDE MICROPLASTICS ON MCF-7 BREAST CANCER CELL MIGRATION** ***Britney Alcantara, Alana Esposito***, Dr. Kyle Murphy, and Dr. Lori White; Department of Biochemistry and Microbiology Rutgers University, New Brunswick, NJ	34

	OXIDATIVE DAMAGE IN PYGMY RATTLESNAKES (*SISTRURUS MILIARIUS*) ***Luisa Romano*,** and Dr. Joseph Agugliaro Department of Biological Sciences Fairleigh Dickinson University, Madison, NJ	
PBT 11	**WIRED FOR MODERATION: TOLL-LIKE RECEPTORS AS REGULATORS OF ALCOHOL-INDUCED BEHAVIORS** ***Kamya Shah*,** *Gursimran Gujral*, *John Chahine*, *Madhriay Mehta* and Dr. Christos Suriano; College of Science & Mathematics, Montclair State University, Montclair, NJ	43

***Coordinator**

Poster Session A: Biochemistry

JUDGES: Dr. Suresh Sahni*
Dr. Robert Barrows
Dr. Mihaela Leonida

Poster#	Title, Author(s), Affiliation(s)	Page#
BC 1	**KINETIC ANALYSIS AND INHIBITION STUDY OF TM1785, AN ACETYLORNITHINE AMINOTRANSFERASE FROM *THERMOTOGA MARITIMA*** ***Lawrence Boadi***, Drishti Agrawal and Dr Jennifer Martin Department of Biochemistry and Molecular Biology Stockton University, Galloway, NJ	44
BC 2	**ISOLATION OF AN APTAMER SELECTIVE TO GLUCOSE** ***Deirdre Campbell*,** and Dr. Jonathan Ouellet Department of Chemistry and Physics Monmouth University, Long Branch	45
BC 3	**PRECISION MOLECULAR DESIGN OF 6-CARBOXY FLUORESCENCE DERIVATIVES: TARGETING ALPHA GLYCOSYL TRANSFERASE AS A PROMISING CHEMOTHERAPEUTIC AGENT** ***Nalini Naidu. Gorajana*[i] & Dr. Abu Gafar Hossion[ii], Department of Biomedical Engineering[i] Department of Chemistry[ii] University of Bridgeport, Bridgeport, CT	46
BC 4	**INVESTIGATING LOCAL CONFORMATIONAL CHANGES FROM LIGANDS ON G-**	47

	QUADRUPLEX COMPLEXES USING FLUORESCENT BASE ANALOGUES ***Macklin Jugan, Matthew Finkelstein***, and Dr. Davis Jose Department of Chemistry & Physics Monmouth University, West Long Branch, NJ	
BC 5	**EXPLORING QSAR AND qRASAR TECHNIQUES TO EVALUATE TOXICITY IN *DANIORERIO*: A SIDE-BY-SIDE COMPARISON OF 2-, 3-, AND 4-HOURS EXPOSURE WITH MECHANISTIC UNDERSTANDING AND SOLUTIONS FOR MISSING DATA** ***Lu Li***, and Dr. Supratik Kar* Chemometrics and Molecular Modeling Laboratory Department of Chemistry and Physics, Kean University, Union, NJ	48
BC 6	**HAMMERHEAD RIBOZYME CLEAVING ITS RNA SUBSTRATE** ***Ashley Salquero, Sarah Dornemann*** and Dr. Jonathan Ouellet Department of Chemistry and Physics Monmouth University, West Long Branch, NJ	49
BC 7	**THE ROLE OF TYROSINASE IN DETOXIFYING ALDEHYDES AND PREVENTING PROTEIN CARBONYLATION** ***Jakia Uddin***, ***Coral Perez*** and Dr. David A. Snyder Department of Chemistry William Paterson University of New Jersey, Wayne, NJ	50
BC 8	**CURVEIQ: A SYSTEMATIC AND RIGOROUS APPROACH FOR ASSESSING THE THERMODYNAMIC STABILITY OF MACROMOLECULAR STRUCTURES** ***Omar W. Ahmed***, and Dr. Davis Jose; Department of Chemistry and Physics, Monmouth University, West Long Branch, NJ	51

Poster Session A: Nanochemistry

JUDGES: Dr. Nishikant Satam*
Dr. Elmer Mojica
Dr. Hanae Haouari

Poster#	Title, Author(s), Affiliation(s)	Page#
NC 1	**GREEN SYNTHESIS OF ZEIN-BASED NANOPARTICLES ENCAPSULATING**	52

NC 7	**SYNTHESIS AND CHARACTERIZATION OF DIACID PERYLENE DERIVATIVES FOROPTOELECTRONIC APPLICATIONS** ***Adam Weldali***, Razieh Mirsafaei, and Dr. Elena Galoppini* Department of Chemistry, Rutgers University-Newark, Newark, NJ	58

***Coordinator**

Poster Session A: Organic Chemistry

JUDGES: Dr. Mihaela Jitianu*
Dr. Colin Abernethy
Dr, Balwant Chohan

Poster#	Title, Author(s), Affiliation(s)	Page#
OC 2	**EXPLORING MECHANISMS OF BINDING OF CATECHOL DERIVATIVES TOWARDS CATALYTIC DOMAINS OF MMP-9** ***Manoj Kumar Depuru, Priyanka Meda*, Prachet Trivedi**, and Dr. Ish Kumar Department of Chemistry, Biochemistry & Physics Fairleigh Dickinson University, Teaneck, NJ	59
OC 3	**TUNING OPTOELECTRONIC PROPERTIES OF INDOLOINDOLIZINE DERIVATIVES FOR BIOSENSING APPLICATIONS** ***Preethi Devarapalli, Zeynep Coskun*, Rafiatou Bikienga, Busola Owolabi**, and Dr. Nishikant Satam Department of Chemistry, William Paterson University of New Jersey, Wayne, NJ	60
OC 4	**PREPARATION AND STRUCTURAL DETERMINATION OF 1,2-BIS[(ARYL)IMINO]ACENAPHTHENE COMPOUNDS: A MULTIWEEK LABORATORY ACTIVITY FOR ADVANCED UNDERGRADUATES.** ***Nicholas M. Fajardo*, Grace S. Carter, Nicholle B. Chew, Merideth A. Frey**, and Dr. Colin D. Abernethy Organic Chemistry, Sarah Lawrence College Bronxville, NY	61

***Coordinator**

Poster Session B: Cell & Molecular Biology II

JUDGES: Dr. Katsuhiro Kita*
Dr. Pamela Lovejoy

***Coordinator**

Poster Session B: Ecology, Evolution and Environmental Sciences

JUDGES: Dr. Carey Waldburger*
Dr. Karen Swanson
Dr. Bur-Shuan Wang

Poser#	Title, Author(s), Affiliation(s)	Page#
EEE 1	**CORRELATION OF RADIAL TREE GROWTH WITH CLIMATE FACTORS IN NORTHERN NEW JERSEY** ***Himmy Nadendla, Roland Indriksons*, Madonna Barsoum, Marta Urbaniak,** and Dr. Nicole Davi Department of Environmental Sciences William Paterson University of New Jersey, Wayne, NJ	72
EEE 2	**RECONSTRUCTING LATE-GLACIAL TO HOLOCENE CLIMATES: A MULTI-PROXY RECORDFROM LAKE BLAUVELT, NEW JERSEY, USA** ***Roland Indricksons, Sabrina Ryan*,Changhai Hou[2],** Michael L.Griffiths[1], Osamu Seki[3], Aifeng Zhou[4], Alice Hardman[5], Matthew Allison[2], Eve Norris[2], Elizabeth Patterson[2], Michael DaSilva[2], Yuan Ling[6], James Bendle[2] [1] Department of Environmental Science, William Paterson University, United States ofAmerica [2] School of Geography, Earth and Environmental Sciences, University of Birmingham, UnitedKingdom [3] Institute of Low Temperature Science, Hokkaido University, Japan [4] China Key Laboratory of Western China's Environmental Systems, College of Earth andEnvironmental Sciences, Lanzhou University, China [5] Department of Earth and Atmospheric Sciences, Indiana University Bloomington, USA [6] Institute of Geology, Chinese Academy of Geological Sciences, China	73
EEE 3	**A MULTIPROXY HYDROCLIMATE RECORD OF EAST JAVA DURING THE LATE PLEISTOCENE** ***Lilian Pendergrass[1], Jessica Breeden[2]*, E.W. Patterson[2], R. Mortlock[1]**, Dr. M.L. Griffiths[2], and Dr. Y. Rosenthal[1] [1]Department of Earth and Planetary Sciences, Rutgers University, New Brunswick, NJ [2]Department of Environmental	74

EEE 10	**VALIDATION OF A RAPID TEST STRIP ASSAY TO DIAGNOSE METABOLIC HEALTH IN CORALS** ***Shriya Singaraju*[1]**, **Erin Chille**[1], Dr. Tim Stephens[1], and Dr. Debashish Bhattacharya[1] [1] Department of Biochemistry and Microbiology Rutgers University	81
EEE 11	**ASSESING HABITAT SUEASTERN RED BAT IN NEW JERSEY** ***Kamil Kozlowski*[1]**, Dr. J. Angel Soto-Centeno[2] [1]Department of Earth and Environmental Sciences, Rutgers University – Newark, Newark, NJ [2]Department of Mammalogy, American Museum of Natural History, New York, NY	82

***Coordinator**

Poster Session B: Physiology, Behavior and Toxicology II

JUDGES: Dr. Emmanuel Onaivi*
Dr. Jeffery Erickson
Dr. Lorelei Pratt

Poster#	Title, Author(s), Affiliation(s)	Page#
PBT 12	**ANALYZING THE EFFECTS OF TRICLOSAN ON THE EGG LAYING SYSTEM IN *C. ELEGANS*** ***Gabriella N. Akiki*[1]** and Dr. Edith M. Myers[1] [1]Department of Biological Sciences Fairleigh Dickinson University, Florham Campus, Madison, NJ	83
PBT 13	**THE EFFECTS OF Dα7 ON PROGRESSION OF ALZHEIMER'S DISEASE IN AN Aβ42 *D. MELANOGASTER* MODEL** ***Mandy Bhagwandeen*[1*]** and Dr. Pamela Lovejoy[1] [1]Department of Biology St. Joseph's University, Brooklyn, NY	84
PBT 14	**EXAMINING THE BIOLOGICAL BASIS OF PRENATAL STRESS-INDUCED HYPERACTIVITY BEHAVIOR IN *DROSOPHILA MELANOGASTER*** ***Kaela Collazo*** and Dr. Bor-Shuen Wang; Department of Biology, St. Joseph's University, Brooklyn, NY	85

	[1]Dept. of Chemistry and Environmental Science, New Jersey Institute of Technology, Newark, [2]NJDept. of Biological Sciences, New Jersey Institute of Technology, Newark, NJ	
PBT 21	**EFFECT OF MICROPLASTICS ON DEVELOPING ZEBRAFISH CAUDAL FIN REGENERATION** ***Jarin Tasnim; Victoria Walsh***; Tasnia Hossain, Dr. Kyle Murphy and Dr. Lori A. White Department of Biochemistry and Microbiology Rutgers University, New Brunswick, NJ	92
PBT 22	**DETERMINING THE EFFECTS OF TRICLOSAN ON *C. ELEGANS* LOCOMOTOR FUNCTION** ***Hania A. Abdalla[1]*** and Dr. Edith M. Myers[1] [1]Department of Biology & Allied Health Sciences Fairleigh Dickinson University, College at Florham, Madison, NJ	93
PBT 23	**USING A FUNGICIDAL ASSAY TO ASSESS SEASONAL VARIATION IN PLASMA ANTIFUNGAL ACTIVITY OF RUBBER BOAS (*CHARINA BOTTAE*)** ***Marium Rizvi*** and Dr. Joseph Agugliaro Department of Biological Sciences Fairleigh Dickinson University	94

***Coordinator**

Poster Session B: Materials Chemistry

JUDGES: Dr. Nishikant Satam*
Dr. Elmer Mojica
Dr. Jonathan Ouellet

Poster#	Title, Author(s), Affiliation(s)	Page#
MC 1	**ADSORPTION OF CARBON DIOXIDE AND BENZOIC ACID ON ACTIVATED CARBONS PRODUCED FROMCASHEW NUT SHELLS BY UREA MODIFICATION AND POTASSIUM CARBONATE ACTIVATION** ***Maame Adwoa Asamoah Duodu[1*],*** Danela Sadikaj[2], Hellen Ladino[2], Wanlu ~~Li[2], Dr. Svetlana Bashkova[11]~~Department of Chemistry, Biochemistry and Physics Fairleigh Dickinson University, Madison, NJ [2]Department of Chemistry and Biochemistry	95

MC 8	**RHEOLOGY – A TOOL IN DETERMINATION OF CRITICAL PARAMETERS OF HYBRID MATERIALS** ***Destiny Vargas[1], Gabrielle Veloso[1]***, Dr. Andrei Jitianu[2] And Dr. Mihaela Jitianu[1] [1]Department of Chemistry, William Paterson University of New Jersey, Wayne, NJ [2]Department of Chemistry Lehman College, CUNY, West, Bronx, NY	102

***Coordinator**

Poster Session B: Analytical Chemistry

JUDGES: Dr. Suresh Sahni*
Dr. Abu Gafar Hossion

Poster#	Title, Author(s), Affiliation(s)	Page#
AC 1	**MORINGA-INFUSED HERBAL TEAS AS FUNCTIONAL BEVERAGES: ANTIOXITANT ACTIVITY AND PHENOLIC CONTENT EVALUATION** ***Blen Alemayehu*[1]** and Dr. Elmer-Rico E. Mojica[2] [1]Department of Biology, Pace University [2]Department of Chemistry and Physical Sciences, Pace University	103
AC 2	**EXTRACTION AND ANALYSIS OF NICOTINE FROM VARIOUS TOBACCO PRODUCTS** ***Tashirah Burgess*** and Dr. Balwant Chohan Department of Natural Sciences Felician University, Lodi, NJ	104
AC 3	**DISCRIMINATION COFFEE VARIETIES USING FTIR SPECTROSCOPY AND PRINCIPAL COMPONENT ANALYSIS** ***Nic Carbone*** and Dr. Elmer-Rico E. Mojica Department of Chemistry and Physical Sciences Pace University, New York, NY	105
AC 4	**QUANTITATIVE ANALYSIS OF IRON CONTENT IN FORTIFIED CEREALS USING ATOMIC ABSORPTION SPECTROSCOPY** ***Elizabeth Daley*** and Dr. Elmer-Rico E. Mojica	106

	Chemistry Department Pace University, New York, NY	
AC 5	**INVESTIGATING THIAMINE FRAGMENTATION USING 2D N** ***Amanda Findura***, Nurzat Ristovski, Dr. Snyder Department of Chemistry, William Paterson University of New Jersey, Wayne, NJ	107
AC 6	**SYNTHESIS OF SILICA-METAL COMPOSITE NANOPARTICLES DECORATED WITH POLY-RHODANINE** ***Nathfelli Garcia*[1]**, **Christopher Trochez**[1], **Dante Gilberti**[1], Dr. Moni Chauhan[2] and Dr. Bhanu P. S. Chauhan[1] [1]Engineered Nanomaterials Laboratory, Department of Chemistry William Paterson University of New Jersey, Wayne, NJ [2]Department of Chemistry CUNY -Queensborough Community College, Bayside, NY	108
AC 7	**A SPECTROSCOPIC EVALUATION OF THE B TO A CONFORMATIONAL TRANSITION IN DUPLEX DNA USING FLUORESCENT BASE ANALOGUES** ***Maria J. Hernandez Campos*, *Noureen Qureshi*,** Sam LeCrone and Dr. Davis Jose Department of Chemistry and Physics Monmouth University, West Long Branch, NJ	109
AC 8	**REGIONAL DIFFERENCES IN THE ANTIOXIDANT PROPERTIES OF UNITED STATES PROPOLIS SAMPLES** ***Gedalya Kolesin*** and Dr. Elmer-Rico E. Mojica Department of Chemistry and Physical Sciences Pace University, New York, NY	110
AC 9	**GEOGRAPHICAL VARIABILITY IN THE ANTIOXIDANT PROPERTIES OF PROPOLIS FROM EUROPE** ***Ayman Mhamdi*** and Dr. Elmer-Rico Department of Chemistry and Physics Pace University, New York, NY	111

***Coordinator**

Abstracts

CLONING AND OVEREXPRESSION OF A *KARENIA BREVIS* CASPASE-3-LIKE GENE IN *E. COLI* USING AN ALTERNATE START CODON

***Antonio Guarino*[1]** and Dr. Emily A. Monroe[1]
[1]Department of Biology
William Paterson University, Wayne, NJ

Blooms caused by the toxic dinoflagellate *Karenia brevis* persist in the Gulf of Mexico for months, with no known mechanism for their termination. Programmed Cell Death (PCD) has been proposed as a possible cause for termination, and caspase activity has been detected in *K. brevis*. A candidate caspase gene (Kb-cas3) was identified in a 2014 transcriptome that could be responsible for caspase activity. Previous work in the lab has resulted in poor overexpression of Kb-cas3 in *E. coli*, and inconclusive caspase assay results. The objective of this study was to overexpress the Kb-cas3 gene in *E. coli* using an alternate start codon. The caspase gene was amplified via PCR, ligated into a pET46 vector, and transformed into BL21 *E. coli* cells. Protein expression was induced with IPTG and cells were incubated overnight at 20°C with shaking. Preliminary analysis of total protein lysates by SDS PAGE revealed two unique proteins in the induced transformed cells compared to uninduced cells and the negative control that were ~ 70 kDa and 30 kDa. KB-cas3 protein is expected to be ~ 60 kDa, so neither protein on the SDS PAGE gel is the expected size for Kb-cas3. To further investigate these proteins, the overexpression experiments were repeated in larger volume cultures, 50 mL and 1 L, and Western blot analysis to detect His-tagged proteins were conducted. Western blots revealed the presence of a unique overexpressed protein in the induced protein lysate of ~ 22 kDa, a protein smaller than expected. Future work will continue to optimize overexpression and analyze caspase activity to provide insight into this protein's possible role in PCD and bloom termination.

AN RNAi SCREEN TO IDENTIFY CELL MIGRATION REGULATORS IN *C. elegans*.

Johnna Mainhart, and Dr. Andre Wallace
Department of Biological Sciences
Fairleigh Dickinson University, Teaneck, NJ

The *Caenorhabditis elegans* genome is 60-80% homologous to humans making it invaluable to genetics research that improves our understanding of humans. Cell migration is a critical process in the functioning of mammalian organisms. In fact, it helps to regulate development, wound healing, immune response and other important biological processes. Numerous disorders have been linked to abnormal cell migration, one of which is cancer metastasis. Actin polarization is a key step during cell migration. In *C. elegans*, actin is a thin filamentous protein that forms a cytoskeleton, and this is highly similar to the human cytoskeleton. One of the pathways that promote proper actin nucleation is the WAVE/SCAR pathway. The WAVE/SCAR complex is activated in response to signals from three axonal guidance receptors (SAX-3/robo, VAB-1/ephrin and UNC-40/netrin). Activation of WAVE turns on ARP2/3, a known actin nucleator, triggering the formation of branched actin and forcing the cell to move. In *C. elegans*, ventral epidermal enclosure has provided a model for us to study WAVE pathway function. There are six rows of epidermal cells that form, actin gets enriched at the leading edge of these cells, forcing them to migrate until they meet. Mutation of any gene in the WAVE pathway prevents proper actin nucleation and leads to a failure in epidermal closure, ultimately causing death. To identify genes that function in the WAVE pathway, we designed an RNAi screen for enhancers and suppressors of *sax-3* embryonic lethality. Mutation of SAX-3 results in approximately 40% of dead embryos. So, we screened for genes that enhanced the embryonic lethality by more than 15% or suppress the lethality by more than 15%. From a list of 500 genes screened, 25 enhanced the lethality and 2 suppressed the lethality. The genes identified have mammalian orthologs and have known functions ranging from early embryonic development to neuronal migration in adults. A subset of these genes will be further investigated to define their exact role in the WAVE pathway during cell migration.

PLMVD AND CIRCULAR RNA

Anahi Menendez, Dr. Ouellet
Department of Chemistry
Monmouth University, West Long Branch, NJ

The Peach Latent Mosaic Viroid (PLMVd) is a viroid that infects peach trees. This viroidhas a unique ability to self-cleave and self-ligate in vivo, using rolling circle amplification (RCA). The purpose of our research is to use these properties of PLMVd to produce circular RNA. The study of circular RNA and its ability to diagnose and prevent disease is especially popular because it is believed that the circular structure protects the molecule from the immune system, specifically from degradation by exonucleases. This makes it a more viable option than linear RNA. For this reason, it is necessary to find an accessible and cost-efficient method to produce circular RNA and study its properties.

The goal is to integrate a target gene into PLMVd so that when the viroid self-ligates intoa circular structure, it will also circularize the inserted gene. A transformation will be done to incorporate a dimer of PLMVd (including the target gene) plasmid into bacteria. In theory, the bacteria should then continuously transcribe dimers of the PLMVd and circularize, thereby circularizing the inserted gene. To retrieve the circular RNA from the bacteria, a magnetic bead primer will be utilized.

THE ROLE OF MITOCHONDRIAL FUNCTION AND INCREASED GLUTAMINOLYSIS IN THE CONTEXT OF PINK1

Melissa Misurelli Dr. Ansu Perekatt and Shima Nejati
Schaefer School of Engineering & Science
Department of Chemistry and Chemical Biology (CCB)
Stevens Institute of Technology, Hoboken, NJ

Glutaminolysis is the process of generating cellular energy from glutamine degradation. Glutaminolysis converts glutamine into glutamate using glutaminase, which then converts into alpha-ketoglutarate.

Glutamine synthesizes metabolites that maintain the transformation of mitochondria into ATP, known as mitochondrial metabolism, which ultimately connects to cancer.

Through a comprehensive literature review, the present study investigated the effects of glutaminolysis and mitochondrial function in the context of PINK1 in cancer. PINK1 functions to target and protect mitochondria using parkin to avoid the accumulation of dead or damaged cells. It was discovered that cancer patients have high levels of glutamate, which is associated with increased tumor invasiveness and metastasis. It was found that tumor cells can thrive better through increased glutaminolysis. By studying PINK1 in the production of extracellular vesicles, it was determined that mitochondrial damage can trigger PINK1 activity and thus allow cancer cells to grow and divide.

The project also involved learning lab techniques by counting cells in normal and tumor regions of pro and anti-inflammatory markers like IL- 6, CD8 and FOXP3, and made experimental applications through immunohistochemistry and H&E staining. To contribute to the laboratory projects and evolving research, the present study also extends to investigating stem cells and inflammation.

THE CELL WALL INTEGRITY PATHWAY AND *SLT2* ARE REQUIRED FOR *FKS2*-MEDIATED ECHINOCANDIN RESISTANCE IN THE OPPORTUNISTIC FUNGAL PATHOGEN *CANDIDA GLABRATA*

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Candida glabrata is an opportunistic yeast that causes invasive infections in immunocompromised individuals. These infections are treated with echinocandins, which inhibit fungal cell wall production by targeting β-1,3-glucan synthase (encoded by *FKS1*/*FKS2* genes), and triazoles, which inhibit ergosterol biosynthesis by targeting lanosterol 14α-demethylase. Echinocandin resistance is primarily associated with mutations in *FKS* genes, while triazole resistance largely stems from *PDR1* mutations that upregulate efflux pumps. The cell wall integrity (CWI) pathway, including Slt2 kinase, play an essential role in fungal tolerance to antifungal drugs. Here, we report that *SLT2* disruption with a *NAT1* marker reversed echinocandin resistance in *fks2* mutants but not in an *fks1* mutant. We successfully complemented this phenotype by reintroducing *SLT2* via a gap-repair cloning technique. Drug susceptibility assays revealed that reintroduction of *SLT2* restored elevated MICs of *fks2* mutants when compared to empty-plasmid controls, as expected. We also disrupted *SLT2* in two *pdr1* mutants to investigate the role of the CWI pathway in triazole resistance. Subsequent drug susceptibility assays showed no significant changes in triazole susceptibilities. Finally, qRT-PCR analysis demonstrated that *SLT2* disruption reduced *FKS2* expression in echinocandin-resistant strains but had little impact on *FKS1* expression. In conclusion, the CWI pathway and Slt2 control, at least in part, *FKS2* expression in *C. glabrata* and are required for Fks2-mediated echinocandin resistance but not for Fks1-mediated echinocandin or triazole resistance.

Investigating the Expression and Regulation of the *mrp* Gene Cluster in the Marine Bacterium *Marinobacter adhaerens*

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Studies in our lab focus on *Marinobacter adhaerens*, a gram-negative bacterium that associates with several harmful algal bloom-producing dinoflagellates. A previous bioinformatic study identified a rare placement of two homologous multigene cation/proton antiporter clusters in the *M. adhaerens* genome: an *mrp* gene cluster adjacent to a *pha* gene cluster. These antiporters couple proton export with cation import and have been shown to have roles in pH homeostasis, cation resistance, biofilm formation, and pathogenesis in other bacteria. This study used β-galactosidase assays to investigate *mrp* cluster expression in varied external pH, [NaCl], and [KCl] conditions. We found an increase in expression in elevated [KCl] and pH conditions that disagrees with complementary real-time qPCR data, suggesting potential translational regulation. Prospective regulators were identified using transposon mutagenesis, wherein a transposon carrying kanamycin resistance on a suicide vector was conjugated into a *M. adhaerens* host with *lacZ* attached to the *mrp* promoter. Conjugates with mutations in genes encoding regulatory proteins were recognized by their differences in color intensity when plated with X-gal and kanamycin. Preliminary β-Galactosidase assays on potential candidates yielded a 50% to 210% increase in *mrp* expression. Candidates will be prepared and sent for sequencing for the identification of potential regulatory proteins.

CANCER'S WEAK SPOT: HACKING TUMOR METABOLISM TO STARVE CANCER CELLS – ANOVEL APPROACH TO CANCER THERAPY

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Cancer cells often rely on aerobic glycolysis, known as the Warburg effect, favoring glycolysis over oxidative phosphorylation even in the presence of oxygen. This metabolic shift supports rapid growth by supplying biosynthetic precursors rather than maximizing ATPproduction. This paper examines the mechanisms behind the Warburg effect and explores therapeutic strategies that target these metabolic vulnerabilities to inhibit tumor progression.

Gluten- and Casein-Derived Peptides Promote Microglial Activation and Inflammatory Responses: Implications for ASD Behaviors

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Behavioral challenges associated with Autism Spectrum Disorder (ASD) are increasinglybeing linked to neuroinflammation, immune system dysregulation, and gastrointestinal disturbances. Studies suggest that diet could contribute to these disturbances. In this study, we investigated whether peptides derived from gluten and casein, the primary proteins found in wheat and milk, can activate human microglial cells, the immune cells of the brain. Our objective was to determine if these common dietary components could stimulate microglia to adopt an inflammatory phenotype, potentially contributing to neuroinflammation and influencing behaviorsfrequently observed in individuals with ASD.

We utilized a human microglial cell line, CRL-3304, and treated the cells with gluten- and casein-derived peptides at two concentrations (1% and 5%) for two durations (6 hours and 24 hours). Untreated cultures served as controls. Morphological features were assessed microscopically before and after treatment. Following exposure, cells were stained with eosin to enhance visualization of cellular structures. Culture supernatants were collected and analyzed using ELISA to quantify the production of interleukin-6 (IL-6), a key pro-inflammatory cytokine released by activated microglia.

Our results showed distinct differences in morphology between treatments. In both 5% and 1% gluten, some microglia became rounded, with shorter and fewer processes, indicative of an activated inflammatory state. Cultures exposed to 1% casein varied; some looked similar to controls, some appeared activated like the gluten-treated cultures, while some had fewer adherent cells and increased numbers of floating cells. In contrast, microglia treated with 5% casein demonstrated significant cellular stress. Most cells were floating, and the few adherent cells showed evidence of membrane damage associated with cell death.

Gluten exposure significantly increased IL-6 production at both concentrations and time points, indicating a strong and consistent inflammatory response. Casein treatment exhibited amore complex pattern; 1% casein elevated IL-6 levels, although with highly variable amounts, while 5% casein resulted in no detectable IL-6. The absence of IL-6 is consistent with our microscopic examination, which revealed extensive cell death with few living cells to secrete cytokines.

Our findings demonstrate that gluten- and casein-derived peptides can differentially activate microglia, inducing them to secrete elevated levels of IL-6, and/or affecting their survival. Increased IL-6 levels imply that microglia foster a neuroinflammatory environment, potentially impacting the neurons regulating behavior. The microglial death induced by 5% casein could impair critical neuroimmune functions. Our data suggest that microglia may be key mediators through which gluten and casein-derived peptides influence neuroimmune interactions relevant to ASD behavioral pathophysiology. Further research is warranted to elucidate the underlying molecular mechanisms.

THE EFFECTS OF POLYAMIDE MICROPLASTICS ON MCF-7 BREAST CANCER CELL MIGRATION

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Breast cancer is one of the main causes of cancer-related deaths worldwide, and metastasis plays a crucial role in disease progression. Cell migration is essential for cancer cells to metastasize and invade other tissues and organs as well as proper wound healing to occur. Microplastics have been found within the human body, but little is known about the effect of microplastics on cancer cell migration. In this study, we investigated the effects of the microplastic polyamide (PMP) on the migration of MCF-7 breast cancer cells using a scratch assay. MCF-7 cells were exposed to four different PMP concentrations, 1 ug/uL, 10 ug/uL, 100 ug/uL, and 1,000 ug/uL and the rate of migration was measured over two days. Our findings demonstrate that polyamide has a dose dependent inhibitory effect on cell migration. Further investigation into the mechanism of polyamide inhibition on cell migration and the potential effects on cell proliferation will be conducted.

REVEALING MORPHOLOGICAL ARCHETYPES TIED TO THE EVOLUTION OF SOCIAL BEHAVIOR IN *SYNALPHEUS*

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Eusociality is a complex syndrome of social organization in animals defined primarily by a reproductive division of labor. While a central feature of ecologically impactful organisms likehoney bees, ants, and termites, the causes and consequences of the evolution of eusociality arenot clear. While phylogenetic data may be used to trace the evolution from solitary to social, morphological analysis may provide insight into how phenotypic evolution accompanies sociality.

Sponge-dwelling snapping shrimp from the genus *Synalpheus* contain almost a quarter of all eusocial origins in animals. These shrimp are inherently morphologically unique, exhibiting bilateral asymmetry in the form of one large "snapper" claw and one smaller pincer claw. Theirlarge claw, which can be half of their body length, is used for antagonistic encounters and defensive posturing.

The eusocial origins within *Synalpheus* are more recent and numerous than those of known social insects. While ants and honey bees tend to be at the forefront of social behavior evolution research, the eusocial origins within these insects both occurred about 120-150 million years ago.In contrast, at least seven independent transitions within *Synalpheus* occurred about 5-10 million years ago. This provides a unique foundation for hypothesis testing and novel approaches to understanding the evolution of social behavior: Can the morphologies of snapping shrimp reveal universal "archetypes" in the evolution of eusociality?

The snapper and pincer claws were compared across species to detect patterns and consistenciesin form tied to the evolution of social behavior. Specimens were analyzed via micro-computed tomography (micro-CT) to generate three-dimensional reconstructions. Preserved specimens were placed under a stereomicroscope to take linear measurements of specific structures.
Preliminary data suggest the snapper and pincer claws are more similar in eusocial species thannon eusocial species, demonstrating that eusociality may consistently shape morphology acrosseusocial origins.

Additional specimens collected in future field work will be used to discover temporal and physical traits associated with the evolution of sociality. Because eusocial societies in *Synalpheus* are understudied, this research will provide a new morphological foundation for understanding eusociality in snapping shrimp that extends to all eusocial organisms.

THE EFFECT OF SEROTONIN DEFICIENCY ON ULTRASONIC VOCALIZATIONS IN NEONATAL *PET-1* KNOCKOUT MICE

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Effective maternal care in rodents depends in part on ultrasonic vocalizations by the pups that trigger survival-promoting behaviors by the dam. The ability of pups to produce effective calls and the ability of dams to hear and respond appropriately to these calls are crucial for pup survival. Defects in either call transmission or call receipt could lead to sub-optimal maternal care and increased pup mortality. Deletion of the *Pet-1* gene results in a 70% loss of central serotonin neurons that is associated with increased mortality of *Pet-1* knockout pups. Specifically, over a large number of litters, 20-25% of knockout pups born to *Pet-1* heterozygous dams die within five days of birth compared to only 3-7% of wild type or heterozygous littermates (Erickson et al., 2007. *Respir. Physiol. Neurobiol.* 159:85-101). We hypothesize that abnormal call production by *Pet-1* knockout pups could contribute to this increased mortality. Previous work from our lab has shown that the general maternal behavior of wild type and *Pet-1* heterozygous dams is indistinguishable. However, a systematic comparison of ultrasonic vocalizations from wild type and *Pet-1* knockout pups, and a behavioral assessment of maternal responses to these calls is needed. In the present study, we performed a comprehensive analysis of previously recorded vocalizations from wild type and *Pet-1* knockout pups, and designed an experimental protocol to test maternal responses to these calls. We hope that these studies will help define the role of central serotonin in pup-dam maternal interactions and contribute to our understanding of why neonatal mortality is increased in *Pet-1* knockout neonates born to *Pet-1* heterozygous dams.

METABOLIC AND BEHAVIORAL EFFECTS OF ESTROGENIC GENDER-AFFIRMING HORMONE THERAPY

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Gonadal steroid hormones including estrogen and testosterone are the most widely utilized treatments for gender-affirming healthcare in transgender and gender-diverse individuals. The needs of individuals undergoing gender-affirming hormone therapy (GAHT) are understudied and the long-term effects of GAHT are largely unexplored. Due to the established correlation between gonadal steroid hormones and metabolic and behavioral impacts, this research aims to provide an animal model displaying the long-term effects of estrogen (E)-GAHT. For this study, 40 wild-type (WT) male mice were divided into 4 groups of 10: 1) intact mice treated with oil; 2) intact mice treated with estradiol benzoate (EB, 150 μg/kg/d) and finasteride (F, .250 mg/kg/d), a blocker of dihydrotestosterone production; 3) orchidectomized (ORX) mice treated with oil; and 4) ORX mice treated with EB (150 μg/kg/d). Mice were pair-housed and treated for a period of 8 weeks before undergoing testing. Testing included behavior evaluations (Open Field Test, Elevated Plus Maze, and Y-Maze) followed by three weeks of metabolic phenotyping (oxygen consumption, feeding, and locomotion) testing. Findings suggest that E-GAHT does not increase avoidance behavior or change spatial memory and the metabolism, feeding, and locomotion are affected by E-GAHT depending on gonadal status (intact or ORX). Future studies will examine which estrogen-sensitive neurons in the brain are modulated by E-GAHT.

THE EFFECT OF PERFLUOROOCTANESULFONIC ACID (PFOS) ON OVARIAN FOLLICLES

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This research investigates the impact of perfluorooctanesulfonic acid (PFOS) on ovarian functionin mice. PFOS is widely used in industrial and consumer products and is highly persistent in the environment, accumulating in organisms through the food chain. Exposure to PFOS has been linked to liver damage, increased cholesterol, and immune dysregulation, but its effects on female reproductive health remain unclear.

The ovary is essential for egg production and hormone synthesis, making ovarian follicles a key model for studying environmental toxicants. We hypothesized that PFOS exposure would disrupthormone synthesis and impair ovarian function. To test this, we isolated and exposed ovarian follicles from adult female CD-1 mice to PFOS (0.1–100 µg/mL) for five days and measured hormone levels using enzyme-linked immunosorbent assay (ELISA).

Our findings revealed significant changes in androstenedione and testosterone levels in the 100 µg/mL PFOS treatment group. Additionally, follicle growth was significantly impaired in the 100 µg/mL PFOS group over 96 hours, with significant effects at 48, 72, and 96 hours. In the 0.1µg/mL PFOS group, statistically significant inhibition of follicle growth was observed at 24 hours. Most notably, across all treatment groups, follicle growth inhibition approached statistical significance ($p = 0.11$) at the 24-hour time point. Given this potential short-term effect, we repeated follicle culture experiments ($n = 5$) to further examine the impact of PFOS on follicle growth, hormone synthesis, and gene expression. Preliminary observations suggest follicle growth inhibition in the 0.1, 10, and 100 µg/mL PFOS groups after 24 hours of culture.

Additionally, we assessed the effects of 96-hour PFOS exposure on ovarian gene expression using Quantitative Polymerase Chain Reaction (qPCR), focusing on pathways related to steroidogenesis, apoptosis, cell cycle regulation, peroxisome proliferator-activated receptor signaling, and oxidative stress. Preliminary qPCR results indicate that PPAR CD36 expression was close to being statistically significant, with $p = 0.076$ at 10 µg/mL PFOS exposure. However, qPCR analysis could not be performed on the 100 µg/mL group due to the toxic effectsof PFOS at this concentration, which caused follicles to shrink rather than exhibit growthinhibition. qPCR analysis is still in progress, and the results will provide further insight into how PFOS affects gene expression in these pathways.

These findings highlight the potential reproductive toxicity of PFOS, even at low concentrations,and underscore its possible role in disrupting female fertility. Given the widespread presence of PFOS in the environment, this work raises important concerns about its impact on public health and the need for stricter regulation of PFAS chemicals.

NANOPLASTICS CAN INFILTRATE MOUSE PLACENTAL TISSUE AND INFLUENCE PLACENTAL MORPHOLOGY

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Plastic production has been increasing exponentially over the past few decades with only10% of plastic being recycled. The remaining portion of plastics are found in the environment and landfills where they break down into smaller particles known as micro and nanoplastics.

Plastic particles have been found to infiltrate the human placenta, an organ developed during gestation responsible for nutrient and waste exchange and immune support. The impact of the presence of these particles, however, is still unknown. To test the impact of nanoplastic presencein the placenta on its function, we orally dosed pregnant CD-1 mice with 50 nm and 200 nm polystyrene nanoplastics at 5 mg/kg body weight/day from embryonic day 8 to 14. Following thedosing period, the placentas were embedded and sliced into 5µm sections for histological analysis. I then measured key morphological structures including the area of 3 key layers: the labyrinth zone (site of cell proliferation), the basal zone (site of glycogen storage and phagocyticactivity), and the decidua (site of hormone production). I also measured the area of the maternal and fetal blood spaces (MBS, FBS) and the length of the intrahemal barrier between them to ensure proper nutrient exchange but they must remain apart to avoid a maternal immune response. Results show no significant differences for placental zone areas and an increase in the area of the FBS in both treatment groups and the MBS in the 50 nm group. This shows that the impact of nanoplastic exposure may be functional rather than anatomical. The results of this study will provide a direction for future experiments to determine disruptions at the molecular level based on identified disruptions to morphology.

BEHAVIORAL ANALYSIS OF SUCROSE CONSUMPTION IN BTBR AND C57 MODEL MICE

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Prior behavioral research has linked substance abuse, such as alcohol and sugar, to chronic stress within animal mice models. This study builds on these findings by examining the effects of stress on sucrose consumption in C57 control mice and BTBR autism model mice. BTBR model mice have been shown to mimic and express autism-like behaviors. They also display unique neurochemical traits such as altered dopamine and serotonin levels. Stress responses in BTBR mice have been shown to involve exaggerated levels of corticosterone, a stress hormone, which influences dopamine and serotonin pathways. These neurochemical systems are important to the brain reward pathways and regulation of stress. This study hypothesized that inducing stress in BTBR mice would upregulate corticosterone, disrupt monoaminergic systems, and result in higher sucrose consumption in comparison to the C57 model.

Both models were exposed to one hour of stress in a dark environment using restriction tubes followed by measurements of sucrose and water consumption of the previous day. This process was repeated over a 5-day period with eight groups consisting of non-stressed and stressed male and female mice from each chosen model. Each group was evenly distributed for the comparative analysis of their consumption levels. Results revealed a significant difference in sucrose consumption among non-stressed and stressed female BTBR mice, showing that there is a presence of stress sensitivity in this model. However, for C57 mice, no significant difference was observed due to limited sample sizes. These results may still show how important the BTBR model is for exploring the relationships between stress and behavior. Future research will need to utilize larger sample sizes to determine significant conclusions.

SEASONAL CHANGES IN BEHAVIORAL RESPONSE TO TERRITORIAL CHALLENGE IN AMIGRATORY SONGBIRD

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Migratory birds experience distinct stages within the breeding season, from territory establishment, to acquiring a mate, nesting, and post-fledging parental care. Overall reproductive success in a given round of breeding depends on appropriate behavioral adjustments to each of these sub-stages. Successful behavioral defense of a breeding territory and a mate are important determinants of reproductive success for many male songbirds. We investigated changes in the aggressive response of male Ovenbirds (*Seiurus aurocapilla*) to a simulated territorial intrusion across three distinct stages of the breeding season. Recordings of male Ovenbird songs, representing a territorial challenge from another male, were played to free-living Ovenbird males on their breeding territories between May and August in 2018 and 2019. Principal components analysisrevealed that overall aggression levels were lowest in May and peaked in June, marked by significant increases in response movements and total response time between May and June. The vocal response showed a distinct shift from higher singing rates in May and June, to low singing rates and high chipping rates in July and August. Shifts in behavioral repertoires from early to late in the breeding season may reflect changes inthe functions of aggressive behavior across sub-stages of the breeding season, or a shift in the costs and benefits of individual behaviors over time.

EFFECTS OF LIPOPOLYSACCHARIDE CHALLENGE AND OPHIDIOMYCOSIS ONOXIDATIVE DAMAGE IN PYGMY RATTLESNAKES (*SISTRURUS MILIARIUS*)

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Ophidiomycosis (formerly known as snake fungal disease), is an emerging disease caused by the fungal pathogen *Ophidiomyces ophidiicola* (*Oo*) that is affecting wild snake populations, thus becoming a threat to biodiversity. The currency mediating the negative sublethal effects of activating the immune system in response to disease isunclear. Energetic costs have been proposed as a mechanism for causing sublethal changes observed in individuals afflicted with ophidiomycosis, such as poor body condition and reduced reproductive investment. However, oxidative damage due to increased metabolic rate and/or increased production of reactive oxygen species by the immune system to fight pathogens has been suggested as well. The goal of this research is to assess whether *Oo* causes oxidative damage in afflicted pygmy rattlesnakes (*Sistrurus miliarius*). Healthy and diseased field pygmy rattlesnakes were treated with a lipopolysaccharide (LPS) injection to induce an immune challenge or with a control injection (phosphate-buffered saline, PBS). Plasma samples collected before and 2 d after injection were examined to assess for changes in oxidative damage levels (reactive oxygen metabolites, ROMs) using the d-ROMs kit. We hypothesized that oxidative damage would occur in pygmy rattlesnakes injected with LPS and/or infected with the *Oo* pathogen, due to increased metabolic activity and/or collateral damage associated with mounting an immune response. We also hypothesized that an additive effect on oxidative damage levels would be observed in snakes with apparent ophidiomycosis receiving an LPS injection. Contrary to our expectations, there was no significant interaction between treatment (LPS or PBS) and time (pre- or post-injection), which suggests that LPS challenge had no significant effect on oxidative damage duringthe time course of our study. A negative correlation between *Oo* clinical sign severity and reactive oxygen metabolites was also observed, indicating that apparent ophidiomycosis was not associated with increased oxidative damage. Our findings may have relevance to understanding disease outcomes in snakes with ophidiomycosis and the ability of afflicted snakes to cope with secondary infections.

WIRED FOR MODERATION: TOLL-LIKE RECEPTORS AS REGULATORS OF ALCOHOL-INDUCED BEHAVIORS

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Alcohol use disorder (AUD) is a major health concern, affecting millions of Americans and ranking among theleading causes of preventable mortality. Despite its widespread impact, the underlying mechanisms driving excessive alcohol consumption and dependence remain under-researched. Emerging evidence suggests that neuro-immune crosstalk plays a pivotal role in modulating alcohol-induced behaviors, with inflammation and neurodegeneration serving as key pathological hallmarks. Toll-like receptors (TLRs), a class of immuno-detectors traditionally associated with innate immunity, have recently garnered attention for their potential role in shaping neural responses to ethanol. In this study, we leveraged the genetically tractable modelorganism *Caenorhabditis elegans* to investigate the role of its sole TLR, TOL-1, in ethanol-induced toxicity, behavior, and learning. Our findings reveal that TOL-1 promotes survival during exposure to lethal doses, mitigates intoxication, promotes learned aversion, and curbs ethanol-seeking behavior after initial exposure. These results highlight TLRs as potential modulators of alcohol consumption and aversion, shedding light on neuroimmune mechanisms that may contribute to the etiology of alcohol use disorder. Understanding these interactions could pave the way for novel therapeutic strategies targeting immune signaling pathways to combatexcessive alcohol intake.

KINETIC ANALYSIS AND INHIBITION STUDY OF TM1785, AN ACETYLORNITHINE AMINOTRANSFERASE FROM *THERMOTOGA MARITIMA*

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TM1785, a protein from the hyperthermophilic bacterium *Thermotoga maritima*, exhibits cetylornithine aminotransferase (AcOAT) activity. AcOAT is crucial in arginine biosynthesis, converting N-acetylornithine and 2-oxoglutarate into ornithine and N-acetylglutamate. Previous kinetic investigation n our lab reported a Km of 42 μM and Kcat of 0.506 s^{-1}; these values showconsistency with previously eported AcOATs. In this study, our lab investigated the effects of concentration-dependent inhibition of TM1785, utilizing the known AcOAT inhibitor, gabaculine. TM1785 was obtained from *E.coli* verexpressing the protein in the laboratory, purified with affinity chromatography, and assayed with oupled reactions with glutamate dehydrogenase, measuring NADPH production at 340 nm. Kinetic ssays were conducted usinginhibitor concentrations ranging from 0.05 mM to 25 mM. Inhibitory effects f gabaculine on TM1785 will be reported.

ISOLATION OF AN APTAMER SELECTIVE TO GLUCOSE

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Diabetes is a disease that hundreds of million people live with daily throughout the world. Currently there is not a long-term cure for diabetes. The day-to-day life of managing the disease consists of blood sugar monitoring by finger pricks, insulin injections and strict diet. The research for a glucose aptamer would be the first step to finding a cure for diabetes. This project uses Systematic Evolution of Ligands by Exponential Enrichment, or SELEX, to select RNA that binds specifically glucose. The process is a cycle beginning with a PCR from a pool of millions and billions different DNA sequences, then transcription to RNA, negative selection, positive selection, and reverse transcription back to DNA. The conclusion of the reverse transcription is the beginning of the next generation where each generation becomes more selective to glucose. Eventually the RNA would be sequenced and converted to a riboswitch. A riboswitch is a sequence of untranslated mRNA that can bind a specific ligand, in this case glucose, and transmit a signal to the expression platform to start the reaction to make a protein. For this project, the riboswitch would begin the production of insulin only in the presence of glucose. By making insulin outside of the pancreas, diabetes patients would no longer need insulin injections or constantly monitor their blood sugar levels. The project is currently on its 26^{th} generation and is continuing to move forward. Once we obtain a high ratio of positive over negative cleavage percentages, we will begin the process to clone DNA and individually test sequences to find an aptamer that cleaves only in the presence of glucose.

PRECISION MOLECULAR DESIGN OF 6-CARBOXY FLUORESCENCE DERIVATIVES: TARGETING ALPHA GLYCOSYL TRANSFERASE AS A PROMISING CHEMOTHERAPEUTIC AGENT

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A molecular docking study has been conducted to investigate 6-carboxy fluorescence derivatives for strategically targeting alpha glycosyl transferase (AGT) protein (PDB id 1XV5, Fig 1a) to explore their use as chemotherapeutic agents.[1,2] Glycans decorate every cell and influence key biological interactions, and AGT is crucial in glycosylation, a process often dysregulated in the implication of various diseases, making it a prime therapeutic target.[3] Moreover, carboxyfluorescein is well known for its fluorescent properties and versatile applications in biological labeling. Targeting ligand 6-carboxyfluorescein derivatives (Fig. 1b) with substitutions at various positions (2', 4', 5' & 7' positions with Iodine, and chromophore groups at 3' and 6') to selective binding of AGT and enhance binding.[4] The findings reveal that the derivatives exhibited exceptionally high binding affinities and, therefore were effective as inhibitors of AGT. Thus, highlights the important understanding of targeted therapies in cancer treatment, contributing valuable insights into creating more effective molecular designs and selective chemotherapeutic agents.[3,4] These studies will validate the computational findings and further refine the design of AGT inhibitors, aiming to develop novel, targeted therapies for diseases involving glycosylation dysregulation.

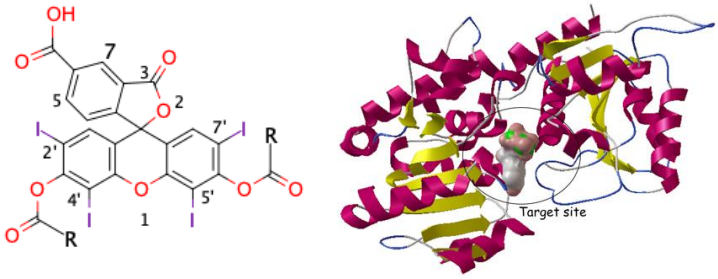

Fig. *Pictorial view of* ***1a****-Targeting ligand 6-carboxyfluorescein derivatives (left) and* ***1b***-targeting alpha glycosyl transferase (AGT) protein, PDB id 1XV5 (right).

References:

1. Melikishvili M, Rodgers DW, Fried MG. **6-Carboxyfluorescein and structurally similar molecules inhibit DNA binding and repair by O⁶-alkylguanine DNA alkyltransferase**. *DNA Repair (Amst)*. 2011;*10*(12),1193-1202.
2. RCSB Protein Data Bank. *1XV5: Alpha-Glucosyltransferase (AGT) in Complex with UDP*. 30 Aug. *2005*
3. Smith, B. A. H., and Bertozzi, C. R. **The clinical impact of glycobiology: targeting selectins, Siglecs and mammalian glycans.** *Nature reviews. Drug discovery*, **2021**; *20*(3), 217–243.
4. Hossion, A. M. L.; Bio, M.; Nkepang, G.; Awuah, S. G.; You, Y. **Visible Light Controlled Release of Anticancer Drug through Double Activation of Prodrug**. *ACS Med. Chem. Lett.* **2012**, *4* (1), 124–127.

INVESTIGATING LOCAL CONFORMATIONAL CHANGES FROM LIGANDS ON G-QUADRUPLEX COMPLEXES USING FLUORESCENT BASE ANALOGUES

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DNA sequences rich in guanines readily fold to form quadruplex structures (GQs), which arebound by Hoogsteen-type hydrogen bonding of four guanine nucleotides (G4). GQs are important structural components in many physiological functions, including limiting telomeraseactivity seen in 85-90% of human tumor cells. Telomerase activity can be influenced byintroducing small molecules that can interact with GQs. This interaction of small molecules can alter the stability and local conformations of the GQ at the guanine tetrad level, which in turn canaffect the telomerase activity and cancer progression.

To identify changes in the local conformations of the telomeric sequence upon interactionwith small organic molecules, we incorporated 6-methylisoxanthopterine (6MI), a circular dichroism (CD)-active fluorescent base analogue of guanine in place of guanine at distinct positions in the human telomeric GQ sequence. Several variations of DNA sequences were used to monitor the conformational changes at different locations of the GQ structure using UV-Vis, CD, and fluorescence spectroscopic methods. Past studies investigated the binding of TmPyP4 (5,10,15,20-Tetrakis-(N-methyl-4-pyridyl) porphyrin), a telomerase-inhibiting ligand, to the GQ but only addressed their interaction in a global conformational perspective. In this study, we usedfluorescent base analogues to track the local conformation at individual G-tetrad levels using spectroscopic methods. The results demonstrated an initial stabilization followed by destabilization of the human telomeric DNA sequence with increasing ratios of TmPyP4, whereas the modified strands showed stabilization or destabilization depending on the position ofthe probe. The results suggest that site-specific fluorescent probes can be used as an “intrinsic sensor” to monitor the global and local structure and stability changes in GQs upon ligand binding. Understanding the effect of different drugs on the local GQ conformation will help to develop targeted drugs to treat cancer and other telomere-related disease

EXPLORING QSAR AND qRASAR TECHNIQUES TO EVALUATE TOXICITY IN *DANIORERIO*: A SIDE-BY-SIDE COMPARISON OF 2-, 3-, AND 4-HOURS EXPOSURE WITH MECHANISTIC UNDERSTANDING AND SOLUTIONS FOR MISSING DATA

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Under the Toxic Substances Control Act (TSCA), the US EPA is tasked with tracking every chemical in use across the country, a complex endeavor given the roughly 86,000 substances already identified, with additional ones emerging yearly. Evaluating the toxicity of each chemical individually is unrealistic, so computational techniques such as quantitative structure- activity relationship (QSAR) and quantitative read-across structure-activity relationship (qRASAR) serve as effective tools for estimating aquatic toxicity, essential for preserving aquatic ecosystems and public health. For this study, we compiled acute LC_{50} (median lethal concentration) toxicity data for zebrafish (Danio rerio), a key species in ecotoxicity testing, drawing from the US EPA's ToxValDB. We sorted the data by experimental conditions, including study focus (mortality), test length (2, 3, or 4 hours), exposure approach (static or renewal), medium (tap water), and chemical class (industrial compounds or drugs). This organization produced datasets with 97 entries for 2-hour tests, 45 for 3-hour tests, and 356 for 4-hour tests. Leveraging this information, we built six solid QSAR and qRASAR model groups to predict aquatic toxicity in zebrafish. Our analysis revealed that qRASAR models reliably outperformed QSAR models in external validation across all durations. In the 3- and 4-hour models, qRASAR also showed superior internal prediction results, though the 2-hour models hadnearly identical Q^2_{LOO} scores for both methods. To showcase their utility, we applied these models to forecast toxicity for more than 1,100 external chemicals lacking prior zebrafish data, filling critical gaps in ecotoxicity knowledge. By blending QSAR and qRASAR across different timeframes, we improved the precision of aquatic toxicity predictions and gained a deeperunderstanding of chemical toxicity processes. These models provide a robust foundation for regulatory oversight and risk analysis, advancing efforts to safeguard the environment.

Keywords: Aquatic toxicity, Drinking water LC_{50}, QSAR, USEPA, Zebrafish

HAMMERHEAD RIBOZYME CLEAVING ITS RNA SUBSTRATE

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Hammerhead ribozymes are small self-cleaving RNA molecules with significant potential in genetic therapy due to their catalytic RNA-cleaving activity. Understanding their enzymatic mechanism is essential for optimizing their therapeutic application and broadening our understanding of the RNA cleavage mechanism. These ribozymes function by inducing site-specific cleavage of RNA sequences, making them valuable tools for targeted gene regulation and antiviral strategies.

This project aims to develop a simple and affordable kinetic assay for cleaving activity to study hammerhead ribozyme activity using SYBR Gold gel staining. The assay will allow for real-time observation of RNA cleaving events, providing insight into the ribozyme's catalytic efficiency and structural dynamics. The study focuses on the cleavage efficiently by using the gel staining dye SYBR Gold. Additionally, the research will explore key factors influencing ribozyme activity, such as ionic concentration, temperature, substrate, and sequence specificity, to optimize reaction conditions.

Furthermore, this research explores the potential application of hammerhead ribozymes, particularly in targeting viral RNA genomes, such as those of certain viral infections, such as HIV, by targeting its RNA sequences.

THE ROLE OF TYROSINASE IN DETOXIFYING ALDEHYDES AND PREVENTING PROTEIN CARBONYLATION

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Lipid oxidation generates reactive aldehydes like malondialdehyde (MDA) and 4-hydroxynonenal. These aldehydes can modify proteins, amino acids, lipids, and carbohydrates, through secondary protein carbonylation. This contributes to lipofuscin accumulation, a process linked to the pathogenesis of neurodegenerative diseases. Tyrosinase, a copper containing oxidase, is primarily known for its role in melanin synthesis. We propose that tyrosinase may also facilitate the detoxification of these aldehydes by (co-) catalyzing amino acid catalyzed aldol condensation reactions. This would reduce the number of reactive carbonyls present by half and trap the aldehydes in compartments where tyrosinase is localized. Docking studies suggest the presence of a secondary active site, distinct from the canonical active site, that catalyzes the aldol condensation reaction between the aldehydes and enamines. Further docking studies indicate that α-Cyano-4-hydroxycinnamic acid (HCCA), a known inhibitor of tyrosinases oxidase activity, may also bind to tyrosinases putative secondary active site. Our findings suggest, that while HCCA does appear to competitively inhibit tyrosinase co-catalysis of aldol condensation reactions, this competitive inhibition does not rule out the existence of a secondary active site on tyrosinase. The possibility of inhibitors of tyrosinase binding at different sites would thus explain how some inhibitors noncompetitively inhibit oxidation and some competitively inhibit oxidation depending on the substrate used. Currently, we are exploring the use of nuclear magnetic resonance (NMR) and infrared spectroscopy, to quantify secondary protein carbonylation, in order to further elucidate the biochemical implications of tyrosinases promotion of aldol condensation.

CURVEIQ: A SYSTEMATIC AND RIGOROUS APPROACH FOR ASSESSING THE THERMODYNAMIC STABILITY OF MACROMOLECULAR STRUCTURES

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The structure and stability of biological macromolecules, including nucleic acids and proteins, are influenced by various factors, such as temperature, solvent conditions, pH, salt concentrations, and the presence of relevant small molecules. Historically, thermal denaturation curves have been used to monitor the stability of macromolecules as a function of temperature under different conditions. Spectroscopic methods, including UV-visible absorbance spectroscopy, circular dichroism, and fluorescence spectroscopy, can be employed to experimentally determine the melting profile of macromolecules. For nucleic acids, the nearest neighbor model is the most common approach for analyzing and interpreting the experimentally obtained denaturation profiles. Analyzing the experimentally determined thermal denaturation curves and comparing them with theoretically predicted values provides insights into the structural details of the molecules. However, analyzing the experimentally determined melting curves is a multifaceted and multivariate process involving numerous regression and error analysis steps. Previously developed thermal denaturation fitting software, such as MeltWin and MeltR, can be utilized to obtain consistent and reliable thermal fitting curves and support data extraction. However, since MeltWin is no longer maintained and MeltR limits user involvement, we created CurveIQ, an open-source thermal denaturation software package that is highly user-friendly and allows users to control the selection parameters according to the experimental conditions. Additionally, CurveIQ can analyze and extract the thermodynamic parameters of biological macromolecules not only from data collected by UV-visible spectrophotometers but also from circular dichroism and fluorescence spectroscopic methods.

ENCAPSULATING SPIRULINA EXTRACT AND CATALASE FOR ADVANCED SKINCARE APPLICATIONS

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The demand for sustainable and bioactive ingredients in skincare has driven the exploration of nanotechnology-based delivery systems. This study presents a green synthesis approach for zein-based nanoparticles encapsulating spirulina extract and catalase, designed to enhance skin health and protection. Zein (Z), a biodegradable and biocompatible protein derived from corn, provides a stable delivery matrix, while spirulina (S) extract, rich in antioxidants and essential nutrients, helps combat oxidative stress and promotes skin rejuvenation. Catalase (CAT) further enhances the formulation by breaking down hydrogen peroxide, reducing oxidative damage, and mitigating signs of aging. The nanoparticles were synthesized using an antisolvent method that replaced flammable ethanol with aqueous propylene glycol. Zein solution was maintained under continuous stirring while the spirulina extract and catalase were added. Subsequently, the mixture was poured into water and particles precipitated (antisolvent method, Figure 1). Addition of anionic GA stabilized the positively-charged zein-based particles. The composites were characterized by: FTIR, composition, encapsulation efficiency and loading capacity for spirulina, size, zeta potential, antioxidant effect, and modulatory effect on MMP-1 (collagenase I, matrix metalloproteinase-1) activity. All showed antioxidant and anticollagenase activity. The activity of encapsulated CAT was remarkably stable over 120 days.

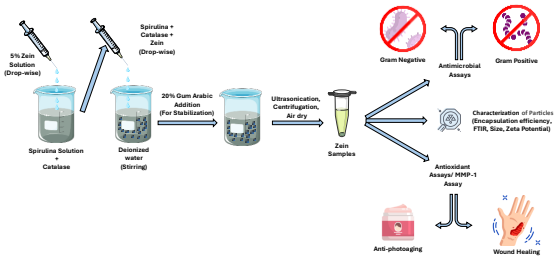

Figure 1. Synthesis of the Z-S-CAT-GA particles

These bioactive nanoparticles offer promise for applications in anti-aging formulations, where their antioxidant properties can protect skin cells from free radical damage and improve overall skin resilience. Additionally, they have potential for use in wound healing and post-inflammatory hyperpigmentation treatment helping to accelerate skin repair/discoloration. The controlled release of encapsulated bioactives ensures prolonged efficacy, making this nanocarrier system an ideal candidate for next-generation skincare products.

METAL NANOPARTICLES AND STÖBER SILICA NANOCOMPOSITES

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Silica nanoparticles can be synthesized in a wide range with different surface modifications that makes them valuable for applications in medical diagnostics, catalysis, and drug delivery. This is due to their high biocompatibility, thermal and chemical stability, and ease of functionalization. Stöber's method is very reliable and high yielding method which allows one to prepare silica particles of 1 micron size with high selectivity.

In this study Stöber silica was synthesized using the Stöber method and used as starting material. After isolating 1 micron size Stöber silica various metal salts were stirred with these particles at room temperature. We discovered that the silica particles acted as glue and led to the reduction of metal salts to nanoparticles depending on metal. In this paper, we will present results of these investigation with various Copper and Silver salts. The resulting products were analyzed via Infra-Red spectroscopy, UV- Vis spectroscopy, and Transmission Electron Microscopy. Future studies will focus on the catalytic applications of silica metal conjugates as well as their utility as antimicrobial and drug delivery agents.

ENCAPSULATION OF SPIRULINA AND CATALASE IN CHITOSAN-BASED NANOPARTICLES FOR USE IN TOPICAL ANTI-INFLAMMATORY APPLICATIONS

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Dr. Mihaela Leonida, Dr. Ish Kumar
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Spirulina (S) has been noted for its vast array of health benefits, both when ingested and in topical applications. A potent antioxidant, S has anti-inflammatory and antimicrobial properties. To further the applications in which S can be used, we studied its encapsulation in chitosan-based nanoparticles (CNP). Nanosized particles display increase penetration into the skin and possibility of controlled release of encapsulated molecules. Chitosan (C), derived from chitin from shrimp, was chosen due to its properties, cationic, inexpensive, antioxidant and antimicrobial. CNP encapsulating spirulina were prepared by ionotropic gelation using sodium tripolyphosphate (TPP) as crosslinker. Catalase (CAT), a strong antioxidant, was also encapsulated in some of the CNP-S matrices.

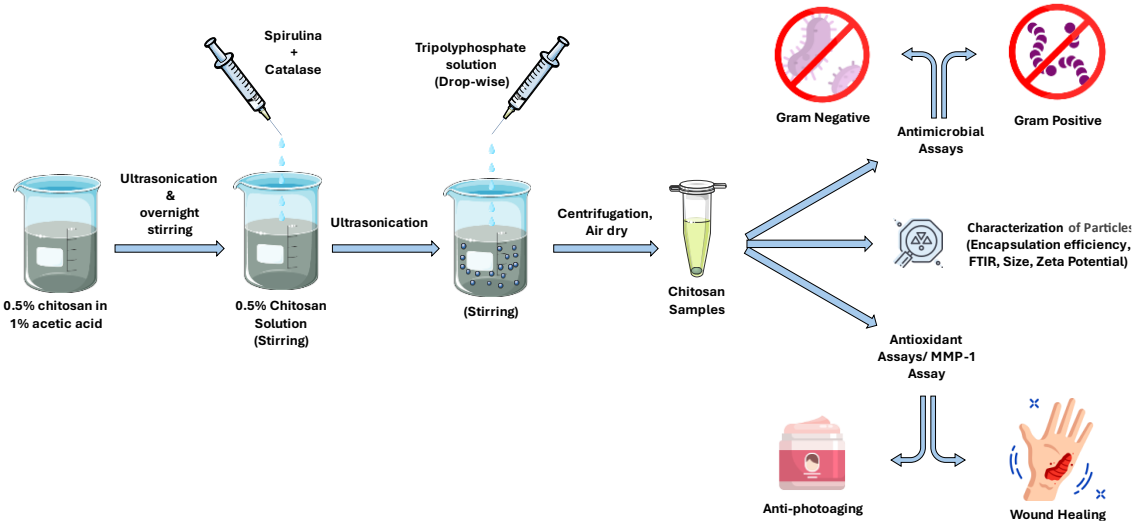

Figure 1. Flow chart of C/S/CAT/TPP composite nanoparticle

Nanomatrices containing different ratios C:S:CAT were prepared then characterized by FTIR, encapsulation efficiency and loading capacity of S, size, zeta potential, and kinetics of S release. The CNPs displayed high encapsulation efficiency and sustained release. The influence of encapsulation on CAT activity and the antioxidant effect of the composites were assessed using spectrophotometric assays. Residual activity of encapsulated CAT was remarkably stable over 120 days. The modulatory effect of CNP-S-CAT on the activity of matrix metalloproteinase-1 (collagenase, MMP-1) was assessed using enzymatic assays. All samples displayed antioxidant and anticollagenase activity.

FACILE ONE-POT ROUTE TO CYCLIC SILANES STABILIZED SILVER NANOPARTICLES

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Hydrosilanes are versatile reagents used in the production of metallic nanoparticles. Research in our group explored long alkyl chain silanes to synthesize metal core nanoparticles[1-2]. The silane chain provided excellent stable reactivity and stability without compromising the nanoparticle[3]. For this investigation, we utilize a cyclic hydrosilane structure to exploit their dual nature both as a reducing and stabilizing agent in the synthesis of silver nanoparticles. The Si-H bond of the silanes facilitates the reduction of the silver salt, while the bulky alkyl chain prevents further aggregation by creating a passivation layer on the nanoparticle surface, providing a simplified path with no additional reagent or further modification[1-2].

In this presentation we will describe a one-pot synthesis of metal nano-raspberry structures obtained under inert conditions using cyclic silanes as reducing and stabilizing agents. A variety of cyclic silanes, such as D_4^H, a cyclic substituted siloxane, and D_4^N, a cyclic substituted silazane were utilized to create new metallic nanostructures. We will also demonstrate that the variations in the ratio of cyclic silanes to metal salts can lead to novel nanoparticles of unusual morphologies. In addition, a detailed analysis of nanoparticles and reaction mixtures was undertaken using FTIR, UV- Vis, TEM, and SEM analysis.

CREATION AND CHARACTERIZATION OF ORGANOID-LIKE STRUCTURES OF COLON CANCER

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Dr. Zhuozhuo Yin and Dr. Nuo Xu
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Current colon cancer organoid models, known as three-dimensional cell cultures, lack stability and uniformity, limiting their effectiveness in cancer research. There is a need for reproducible and structurally consistent organoids to improve disease modeling and drug screening. This research project investigated the use of polycaprolactone (PCL) microspheres as scaffolding to mimic the natural extracellular matrix and improve the stability and uniformity of colon cancer tumor organoids. The porous PCL microspheres, with diameters ranging from 160 to 200 μm, were fabricated using double emulsion solvent evaporation (ESE) and treated with sodium hydroxide andanhydrous ethanol to enhance porosity. Using dynamic cell seeding and culture, these porous PCL microspheres effectively supported the culture of SW480 colon cancer cells. The resulting cell- laden microspheres were then characterized for their organoid-like structure using live/dead staining, methylene blue staining, and histological analysis. By improving the stability and uniformity of tumor organoids, this research aimed to enhance cancer modeling specific to colon cancer. These advancements are expected to benefit cancer researchers, biomedical scientists, and pharmaceutical developers by providing more reliable in vitro models for studying tumor behavior and testing therapeutic strategies. Addressing the need for stability and uniformity in tumor organoids through PCL microsphere-based scaffolds could contribute to the development of accurate and reproducible cancer models, ultimately advancing the understanding and treatment of colon cancer in future biomedical research.

Acknowledgements:
Zhuozhuo Yin, Nuo Xu

SILVER NANOPARTICLES WITH VINYL FUNCTIONALITIES

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The new opportunities arising due to the size regime of nanoparticles have been subject of intense research due to their applications as biological, medicinal, catalysts, optical materials to name a few. The research in our group focuses on the controlled synthesis of silver nanoparticles containing numerous morphologies through the exploitation of silicon-based molecules. We are investigating various size and morphology regimes of silver nanoparticles due to applications in optics, biosensing, catalysis, and wound healing. In this research we disclose the synthesis of silver nanoprisms using 3-(N-styryl methyl-2-aminoethylamino)- propyltrimethoxysilane hydrochloride (3-SAS) as stabilizing and reducing agent. The 3-SAS was utilized as our amino-silane of choice due to its reduction and stabilization properties. As a result of these properties, less chemicals are utilized during the nanoparticle synthesis process. The ratio between silane to silver salt has been found to yield nanoparticles of different shapes and morphologies. In this testing, the formation of our silver nanoparticles was followed over a period of up to 3 days using UV-vis spectroscopy. Additionally, the nanoparticles were examined using a transmission electron microscope (TEM) to see what different morphologies formed.

SYNTHESIS AND CHARACTERIZATION OF DIACID PERYLENE DERIVATIVES FOROPTOELECTRONIC APPLICATIONS

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and Dr. Elena Galoppini*

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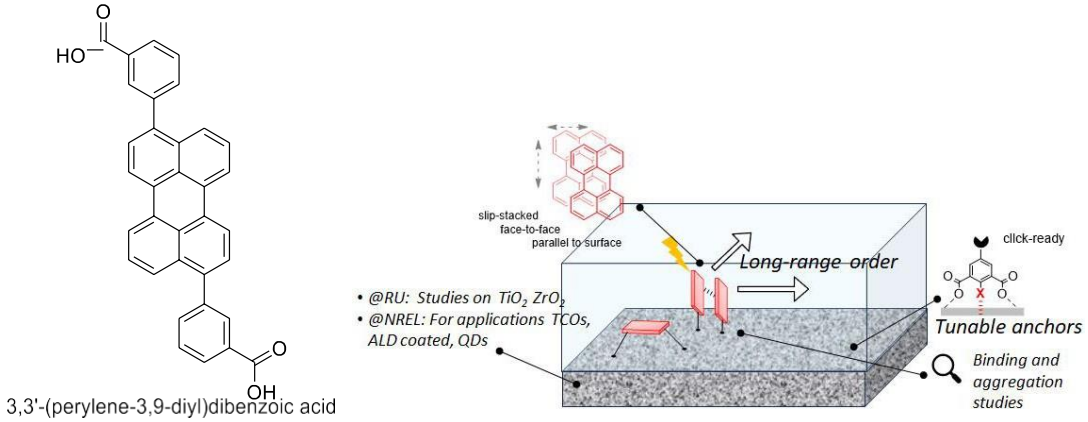
This study aims to develop perylene derivatives functionalized as diacid for hybrid organic/inorganic materials. These hybrid systems are used in a variety of devices and applications, including photovoltaics.In this study, the anchor group of a Perylene-based system was modified to compare its photophysical properties in solutions and bound to quantum dots (QDs). Perylene derivatives are well known for their favorable photophysical properties, such as high thermal stability, strong absorption in the visible range, and high fluorescence quantum yields. These characteristics make them ideal candidates for enhancing theperformance of semiconductor interfaces.

The goal of this research is to design and synthesize a di-acid functionalized perylene (DAP) to achieve controlled orientation of binding in QD binding. Symmetry plays a crucial role in the binding interactions between these organic compound and inorganic QD, ensuring efficient charge transfer and improved photophysical stability. Such improvements are essential for applications in solar cells and photocatalysis.

The synthesis of DAP involved Suzuki-Miyaura cross coupling with dibromoperylene followed by ester hydrolysis to form the corresponding diacid, which is the anchor group required for covalent binding and electronic compatibility with QD (Scheme 1). Characterization techniques including FT-IR ATR spectroscopy, ^{1}H NMR, UV-Vis and fluorescence spectroscopy and high-resolution mass spectrometry (HRMS) were employed to confirm the molecular structure and purity of DAP and study the optical properties.

The insights gained will contribute to the development of next-generation photovoltaic technologies through enhanced molecular interactions at semiconductor interfaces.



Scheme 1. Hybrid organic/inorganic materials from DAP for studying the binding of acid anchor groups for QDs.

EXPLORING MECHANISMS OF BINDING OF CATECHOL DERIVATIVES TOWARDS CATALYTIC DOMAINS OF MMP-9

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The catechol derivatives analyzed in this study include (-)-epinephrine, (±)-epinephrine, L-DOPA, norepinephrine, metanephrine, levodopa, and dopamine. Matrix metalloproteinases (MMPs) are zinc- and calcium-dependent enzymes essential for various physiological and pathological processes, including inflammation, wound healing, tissue remodeling, and embryogenesis. Due to their critical roles, identifying molecules that regulate MMP activity is a key focus in clinical research. Tissue inhibitors of matrix metalloproteinases (TIMPs) tightly regulate MMP activity to prevent excessive tissue degradation. However, dysregulation of MMP activity has been linked to conditions such as rheumatoid arthritis, cardiovascular diseases, and cancer metastasis. Our lab has recently reported active-site inhibitors and catechol-based exogenous activators of MMPs. Docking studies with these modulators suggest the presence of at least one allosteric site within the catalytic domain, where an activator can bind to enhance enzyme activity. In this study, we investigate a broad range of catechol derivatives, with a focus on their interactions within both sites of the catalytic domain of MMP-9. Detailed kinetic analyses and curve fitting using Dynafit 4.0 indicate that these modulators bind to two distinct sites: the active site and the allosteric site. Binding to the active site leads to inhibition, whereas binding to an allosteric-site results in enzyme activation. We determined the binding constants for both sites, revealing that catechol derivatives with a charged side chain at position 4 exhibit a higher affinity for the active site, promoting inhibition. Conversely, derivatives with uncharged side chains display stronger allosteric effects due to their lower affinity for the active site.

TUNING OPTOELECTRONIC PROPERTIES OF INDOLOINDOLIZINE DERIVATIVES FOR BIOSENSING APPLICATIONS

Preethi Devarapalli, Zeynep Coskun, **Rafiatou Bikienga, Busola Owolabi**,
and Dr. Nishikant Satam
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Sustainable materials development centers on creating a facile process for designing and synthesizing high-performance compounds. The development of advanced materials for biosensing is driven by the need to finely tune electronic properties within stable, polycyclic frameworks (PACs). Our work focuses on bridging the gap between innovative material synthesis and practical biosensing applications. The literature studies have shown that such enhancements in Indoloindolizine derivatives led to robust fluorescence and high stability under ambient conditions, thereby positioning these materials as future biosensing platforms. This study focuses on synthesizing ring-expanded indolizine derivatives through a strategic annulation reaction between 2-carboxyaldehyde indole and trans 2-buteonate. Thereby systematically increasing the number of rings in the indoloindolizine moiety, we enhance π-electron delocalization, effectively modulating the HOMO–LUMO gap and improving charge transport, resulting in improved optoelectronic properties.

PREPARATION AND STRUCTURAL DETERMINATION OF 1,2-BIS[(ARYL)IMINO]ACENAPHTHENE COMPOUNDS: A MULTIWEEK LABORATORY ACTIVITY FOR ADVANCED UNDERGRADUATES.

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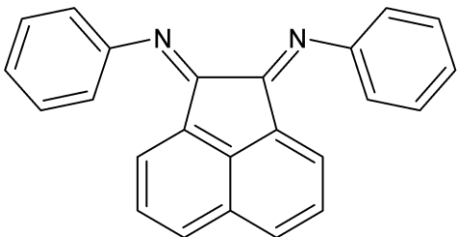
The synthesis of imines via the acid-catalyzed condensation of either aldehydes or ketones with primary amines is a commonly studied reaction during the second semester of organic chemistry. 1,2-Bis[(aryl)imino]acenaphthenes are a family of stable α-diimine compounds, which are readily prepared from the reaction of the diketone, acenaphthenequinone, with substituted anilines using either protic or Lewis acid catalysts. The stability of 1,2-bis[(aryl)imino]acenaphthenes, together with their rigid core structure, have made them attractive di-dentate ligands for the synthesis of highly reactive and catalytic complexes of both main group and transition metals. The synthesis and characterization of 1,2-bis[(aryl)imino]acenaphthene compounds is, therefore, an interesting and rewarding laboratory project for advanced undergraduate students.

The syntheses of several different 1,2-bis[(aryl)imino]acenaphthenes are described, as well as their characterization using IR spectroscopy and a variety of one- and two-dimensional NMR techniques. These activities have been demonstrated to provide excellent experiences for advanced undergraduates. The syntheses of the compounds reliably give good yields of pure products, while the analysis of their NMR spectra (^{1}H, ^{13}C, and 2-dimensional techniques) present challenging (but solvable) structural elucidation puzzles.

In our presentation, we describe the experiments, their expected results, and the learning outcomes from a group of senior and junior undergraduates who completed this project.



General structure of a bis[(aryl)imino]acenaphthene

QUANTITATIVE ANALYSIS OF COST REDUCTION AND SUSTAINABILITY THROUGH THE RECOVERY AND RECYCLING OF ACETONE WASTE FROM A FIRST SEMESTER ORGANIC CHEMISTRY LABORATORY COURSE

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Fairleigh Dickinson University, Teaneck, NJ

The widespread use of acetone as a solvent in undergraduate organic chemistry laboratories results in significant chemical waste and recurring costs for academic institutions. This study investigatesthe feasibility of recycling acetone waste generated in Organic Chemistry I laboratories at Fairleigh Dickinson University to reduce departmental expenditures and promote sustainability. Waste acetone wasfirst processed using a rotary evaporator (RotoVap) to remove high boiling contaminants and dissolved solids. The recovered acetone was then subjected to filtration with activated charcoal to eliminate residualorganic impurities. To assess the efficacy of the purification process, the final acetone samples were analyzed using mass spectrometry, providing a detailed evaluation of their chemical composition and purity. The financial impact of implementing this recycling protocol was quantified by comparing the recovered acetone yield with the university's annual acetone procurement costs. This study highlights thepotential for integrating sustainable waste management practices into academic laboratory settings, ultimately contributing to both economic and environmental benefits.

RESIN-BASED GREEN CATALYSIS FOR EFFICIENT SYNTHESIS OF 4H-PYRANONES SCAFFOLDS

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and Dr. Nishikant Satam* Department of Chemistry
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Green chemistry principles emphasize the development of environmentally friendly processes that lead to sustainable products. Green catalysis plays a crucial role in promoting environmentally benign processes, thus offering an alternative to chemical invasive methods. It is a key driver for advancing organic synthesis in a sustainable manner. On the principle of green catalysis, the utilization of resin-derived heterogeneous catalysis has emerged as an effective approach in organic synthesis. To provide a sustainable and efficient alternative to conventional acid-catalyzed cyclization methods, which often require harsh reagents and generate undesirable waste. This study explores the use of Amberlite (a proton-exchange resin) as a heterogeneous catalyst for the cyclization of δ-hydroxyalkynones into bioactive 4H-pyranones under metal-free conditions. Thus, resin-derived heterogeneous catalysis can serve as an exemplary green catalyst, offering notable advantages such as atom economy, catalyst recovery, reusability, and effectiveness.

DEVELOPMENT OF A SALT METATHESIS REACTION FOR THE SYNTHESIS OF NOVEL PHOTOACID PRE-CATALYSTS

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Photoacid generators, or PAGs, are molecules that, when irradiated by certain wavelengths of light, generate an acid through a reaction or dissociation. These molecules have applications in the microelectronics industry, polymerization reactions and organic synthesis. In previous research, the mesityl(4-nitrophenyl)iodonium triflate PAG was used as a catalyst for conjugate addition reactions. The goal of this project is to produce, characterize and test the effectiveness of versions of the mesityl(4-nitrophenyl)iodonium cation PAG that are paired with counter-ions other than the triflate anion. Other counter-ions should theoretically be able to produce acids after dissociation from the cation that are stronger than the triflic acid produced by the original PAG. Currently, the anions that are being used to replace the triflate are the tetrafluoroborate, hexafluorophosphate, and hexafluoroantimonate anions, with the source of these anions being their sodium salts. The effectiveness of the modified iodonium PAGs will be explored by comparing their effects on the yield and kinetics of conjugate addition reactions. Different solvents will also be tested to determine if the solvent affects the performance of PAGs with different counter-ions.

QUANTIFYING DYE UPTAKE IN PRESSURIZED ENVIRONMENTS BY UV-VIS SPECTROSCOPY

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The effects of two different long term storage methods were studied to determine the decomposition rate of the cold reactive dye, Procion Blue MX-R. The dye was examined over a four week interval under both ambient and increased (0.7 bar) pressure conditions, with a sodiumcarbonate (soda ash) solution as a mordant for the dye. Over a 50% decrease was observed in dyebinding for both pressurized storage methods, with the largest decrease observed at three weeks. The results indicate a proportional decomposition of the dye over the four week storage period.

MAF1 DEREGULATION IN CROHN'S DISEASE

***Natalie Gallo*[1]**, Stephanie Carbacas-Petroski[2],
and Dr. Laura Schramm[1,3]

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Inflammatory bowel disease (IBD) is a chronic condition affecting millions globally. Symptoms of IBD can include weight loss, abdominal pain, and diarrhea. There are two subtypes of IBD-ulcerative colitis (UC) and Crohn's disease (CD). UC has continuous mucosa inflammation from the rectum to the colon; CD has discontinued mucosa inflammation with granulomas in the gastrointestinal tract ranging from the mouth to the anus. Chronic intestinal inflammation is characteristic of IBD, and prolonged colon inflammation increases the lifetime risk of developing colon cancer. RNA polymerase (pol) III transcription regulates cell proliferation and is deregulated explicitly in various cancers. Accurate RNA pol III transcription requires TFIIIB; subunits include TBP, BDP1, BRF1, and BRF2. TFIIIB is a target of deregulation in human cancers. TBP, BRF1, and BDP1 expression are altered in colon cancer. MAF1 negatively regulates RNA pol III transcription and has been implicated as a biomarker in various cancers, including colorectal cancer (CRC) progression. This study aims to determine if MAF1 plays a regulatory role in IBD. We analyzed publicly available IBD datasets using bioinformatic analysis tools to assess if TFIIIB and MAF1 are deregulated in IBD. Differential gene expression (DGE) analyses indicate that MAF1 expression is significantly decreased in CD but not UC(n = 134). These data suggest a role for MAF1 in IBD. However, additional experiments are warranted.

Keywords: Inflammatory Bowel Disease, Crohn's Disease, RNA polymerase III, MAF1

COMPARATIVE ANALYSIS OF *KARENIA BREVIS* CASPASE-LIKE PROTEINS WITH HOMOLOGS FROM RELATED MARINE MICROBIAL EUKARYOTES

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Karenia brevis is the toxic dinoflagellate responsible for near annual red tides in the Gulf of Mexico that lead to negative impacts on human health, environmental health, and local economies. Understanding the molecular mechanisms underlying *K. brevis* bloom dynamics can help mitigate and manage their negative environmental and economic impacts, but relatively little known about these processes particularly bloom termination. Prior studies have shown that *K. brevis* displays hallmarks of programmed cell death (PCD) including caspase activity; however, no caspase has been published from *K. brevis.* Previous research done in our lab has identified caspase-like proteins in *K. brevis*, yet their evolutionary relationships and functional roles remain unclear. In this study, we use custom BLAST searches in Geneious bioinformatics software to identify homologous caspase-like proteins in transcriptomes of marine microbial microbes from the Marine Microbial Eukaryote Transcriptome Sequencing Project (MMETSP). By analyzing protein sequences from diverse marine eukaryotes, we aim to determine the conservation and potential functional roles of *K. brevis* caspase-like proteins. Preliminary results suggest that *K. brevis* proteins exhibit structural features distinct not only from classical caspases but also from other members of the C14 peptidase family, including paracaspases and metacaspases. These findings indicate potential novel functions for these proteins in cellular processes such as programmed cell death or stress responses. Further computational and experimental analyses will help clarify their role in bloom termination and provide insights into the broader evolutionary history of caspase-like proteins in marine dinoflagellates.

EFFECTS OF THE MRP AND PHA ANTIPORTERS ON PH HOMEOSTASIS AND CATION SENSITIVITY IN *MARINOBACTER ADHAERENS*

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Marinobacter adhaerens is a gram-negative bacterium that was initially isolated from laboratory cultures of a toxic algal bloom incident caused by the dinoflagellate *Karina Brevis*. Earlier bioinformatic analysis in our lab revealed antiporter gene clusters that included *mrp* (multi resistance and pH) and *pha* (pH adaptation) genes. Mrp and Pha are homologous cation/proton antiporters that import protons while exporting cations such as Na^+, K^+, and Li^+ and have been found to play roles in pH homeostasis, cation resistance, biofilm formation, and pathogenesis in other bacteria. Here we present data examining the effects of *mrp*, *pha*, and *mrp pha* deletions on growth in liquid cultures in high pH, elevated [NaCl], and elevated [KCl], and compare it to spot plate assays that examined the ability of these strains to form colonies on agar plates under the same conditions. Our results confirm the critical role played by these antiporters in pH homeostasis and additional roles in Na^+ and K^+ transport.

THE P38 MAP KINASE FAMILY GENE, PMK-1, REGULATES ACTIN NUCLEATION DURING DEVELOPMENT

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An organism's development requires the meticulous process of cell migration. Although there is a wealth of knowledge about the process of cell migration, all the details on how it occurs have not been fully described. There are numerous disorders that have been linked to abnormalities in cell migration. For example, individual and collective cell migration mechanisms are altered in cancer cells. Defective cell migration has also been linked to improper neuronal development contributing to the occurrence of numerous neurodegenerative diseases. In *Caenorhabditis elegans*, the WAVE/SCAR pathway has been shown to regulate epidermal cell migration during embryonic morphogenesis. WAVE receives signals from three axonal guidance receptors (SAX-3, UNC-40, and VAB-1) to nucleate branched actin and initiate cell movement. Actin, specifically filamentous actin (F-actin) plays a crucial role in the closing and formation of embryos in *C. elegans*. During the ventral enclosure step of morphogenesis, actin becomes enriched at the leading edge of the migrating cells and promotes enclosure. We examined actin levels in *pmk-1* mutants by crossing in an actin reporter. Actin imaging was also performed on *pmk-1* RNAi mutants. Loss of PMK-1 resulted in an overall increase of actin in the ventral epidermal cells. We also examined actin levels in double mutants of *pmk-1* and the three axonal guidance receptors. Our preliminary analysis suggests that there is a slight increase in actin levels when both vab-1 and pmk-1 are mutated together. These results are in line with the increased embryonic lethality we see in vab-1 mutants when *pmk-1* is mutated. We intend to further investigate the role PMK-1 plays during the actin nucleation step of embryogenesis. However, our data strongly suggests that PMK-1 does have a role and likely in response to stimuli from one or more of the axonal guidance receptors.

GENETICALLY MODIFYING TOMATO PLANTS TO PRODUCE VITAMIN A

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Vitamin A is essential for all humans as it helps with eyesight, autoimmune disease and other properties. Tomato plants are one of the many sources of this vitamin with lycopene giving tomatoes its distinguishable red color while Beta-carotene is broken down in the human body when consumed to produce vitamin A. In this study, we will be using tomato plants that produce Beta-carotene and genetically modifying it using agrobacterium tumefaciens to allow the tomato plants to produce zeaxanthin. Agrobacterium is a gram-negative bacteria that with the help of a Ti plasmid, can induce rapid proliferation of cells in plants to help provide it with shelter and nutrients. This agrobacterium was modified beforehand to remove the Ti sequence and also the tDNA sequence. The zeaxanthin, although not a specific type of vitamin A, can help with UV ray protection in the retina and help prevent macular degeneration. To modify the tomato plant, a pMKV057 plasmid was used and had the higher copy number origin of replication removed to make it more stable and allows larger growth in E.coli with a *kanamycin* resistant gene as its selectable marker. This plasmid also consisted of a Cas9 sequence, so a 23-nucleotide long gRNA sequence was formed to allow the gRNA to guide the Cas9 sequence. These were done in two separate parts with one part containing the promoter and target part of the gRNA and the other contains the extending "tail" part of the gRNA which will both be assembled and put into the original plasmid to attach to Cas9.

OVARIAN FOLLICLE STEM CELL EXTENSIONS WRAP THE DEVELOPING GERMLINE

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Follicle stem cells (FSCs) in the Drosophila ovary play a crucial role in egg development by producing supportive cells and dynamically interacting with germline cysts within the germarium. These stem cells extend thin cytoplasmic projections that engage with germline cysts coordinately. While previous studies using 3D reconstructions of fixed tissues provided structural insights, they could not capture FSC extensions' real-time behavior. This study aimed to observe the dynamic behavior of FSC cytoplasmic extensions and their role in guiding germline cyst development.

I captured a series of 2D images over time using live imaging, reconstructing them into 3D models to visualize FSC nuclei, cytoplasmic extensions, and germline cysts. This allowed me to study FSC-cyst interactions and movement dynamics. The data revealed that FSC extensions encapsulate germline cysts as they transition from Region 2b to Region 3, forming a scaffold that supports cyst development, guiding their positioning before releasing them at specific maturation stages.

The transition from regions 2b to 3 was particularly dynamic, with FSCs physically engaging with cysts before release. These findings suggest that FSCs act as more than just cell producers; they function as structural guides that help regulate germline cyst development. Live imaging provided new insights into FSC behavior, highlighting their essential role in coordinating cyst maturation and movement within the germarium.

CORRELATION OF RADIAL TREE GROWTH WITH CLIMATE FACTORS IN NORTHERN NEW JERSEY

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Dendrochronology is a vital tool for understanding historical climate conditions and their impact on ecosystems. Tree rings reveal patterns of drought, extreme weather, and shifts in seasonal cycles over decades or centuries. Therefore, they may be used to evaluate the correlation between tree growth and climate change factors in High Mountain Park Preserve of Wayne, NJ. The radial growth in a great variety of deciduous woody plants, such as oaks, are known to be directly related to water availability. Besides, some of the oldest specimens in High Mountain Park are oaks (*Quercus sp.*), making them ideal for the creation of a master chronology of the reserve.

Tree core samples were collected from selected trees and gathered together with older pre-prepared samples for sanding and scanning. Computational tools such as CooRecorder, CDendro, Cofecha, Microsoft Excel, and Climate Explorer were utilized for the tree ring readings, chronology creation, data verification, and correlational analyses to climate data. We aimed to find how winters' timing and length affect tree rings' size and cell density, how extreme weather and seasonal events impacted the growth of trees in this area, and if the observed patterns match historical climate records. The results of this study display how trees are being impacted by global warming, a matter of significance for local forests and ecosystems. This research seeks to provide information for conservation efforts and help others learn about how trees reflect environmental changes, highlighting the significant role of trees as natural record-keepers of the environment.

RECONSTRUCTING LATE-GLACIAL TO HOLOCENE CLIMATES: A MULTI-PROXY RECORDFROM LAKE BLAUVELT, NEW JERSEY, USA

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Lake Blauvelt, situated in the Feltville sedimentary formation of the Piedmont province in New Jersey, USA, originated as a deglacial lake during the retreat of the Laurentide ice sheet (LIS). This study presents a lacustrine record from a six-meter sediment core of Lake Blauvelt dated to ~15,000 years BP, which includes geochemical proxies such as Glyceryl Dialkyl Glycerol Tetraethers (GDGTs), *n*-alkanes as well as their carbon and hydrogen isotopes, etc. These proxies contribute to our understanding of the timing of LIS retreat and enable the reconstruction of paleoclimate variations since the last deglaciation.

The observed patterns in these proxies collectively suggest that over a period of ~15-16 kyr, as the southeastern portion of the LIS retreated, temperatures dropped and vegetation colonized the area. Subsequently, the lake experienced a short-wet period of ~14-13 kyr during which temperatures rebounded. Warmer temperatures following the conclusion of the dry-coolYounger Dryas contribute to the final stages of LIS melting, which results in increased lake recharge. From 8 kyr, the LIS deglaciation was completed, and the lake experienced a dry period with stable temperatures. We suggest that the source of lake recharge also changed, which contributed to a sudden, sharp isotopic change. This was followed by a relatively wet period of 4-0.3kyr. In the last 300 years, the plant wax signal was likely influenced by Europeansettlement of the catchment.

A MULTIPROXY HYDROCLIMATE RECORD OF EAST JAVA DURING THE LATE PLEISTOCENE

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The Indonesian maritime continent, located within the Indo-Pacific Warm Pool (IPWP), is a region of significant climatic and geographic diversity. Its modern climate is characterized by highly variable weather patterns, including shifts between droughts, floods, and forest fires, which impact resource availability and ecosystems on both regional and global scales. These weather patterns are heavily influenced by a combination of climate systems and modes, including the Indo-Australian summer monsoon (IASM), the El Niño Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD), and the Intertropical Convergence Zone (ITCZ). Because the IPWP plays a critical role in modulating regional- to global-scale climate patterns, it is an important area of study for understanding past hydrological variability and teleconnections with higher latitudes, and predicting future climate change impacts in this highly populated region.

Here we present a multiproxy hydroclimate reconstruction using stable isotopes ($\delta^{18}O$ and $\delta^{13}C$) and trace elements (Mg/Ca and Sr/Ca) measured on a 30 cm-long stalagmite (GG1) collected from Gua Gung Cave in the Pacitan Karst Region, southeast Java, Indonesia. Our record, spanning ~85 – 70 kyrs B.P. based on ~10 U-Th dates, covers the transition from Marine Isotope Stage (MIS) 5 to MIS 4, capturing the shift from a warmer interstadial to a cooler stadial phase. Based on modern precipitation isotope data and prior studies from the region, we interpret the $\delta^{18}O$ record to primarily reflect large-scale changes in atmospheric circulation, such that more negative $\delta^{18}O$ indicate deeper convection associated with a strengthened IASM and vice versa. The general trend in $\delta^{18}O$ from 85-70 ka resembles changes local summer insolation, similar to other terrestrial and marine records from Indonesia. Comparing this with the GG-1 $\delta^{13}C$ and trace element records, which are more reflective of local rainfall variability, show similar patterns, particularly at millennial time scales. Specifically, a series of abrupt $\delta^{18}O$ enrichment events coincide with overall higher $\delta^{13}C$, Mg/Ca, and Sr/Ca, suggesting that periods of weaker monsoon convection were linked with lower rainfall in the region.

A MYCOPINS-BASED APPROACH TO UNDERSTANDING SAPROXYLICFUNGAL DIVERSITY IN BOREAL FORESTS

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Fungi play a crucial role in boreal forests as primary decomposers of organic matter, releasing nutrients to the environment and contributing to overall plant and microbial growth. This decomposition causes the structure of detritus to change over time, shaping habitats for other organisms. Succession in this process is impacted by many factors.

Boreal forests contain diverse tree species, primarily angiosperms (broadleaf) and gymnosperms (conifers), which produce hardwood and softwood, respectively. Though both contain cellulose and lignin, they differ in other chemistry that determines characteristics such ashardness and resistance to microbial invasion. Deadwood is a highly diverse nutritional resourceand likely harbors a diverse group of specialized fungal species. Our research examines saproxylic fungi in a boreal forest, where the ecosystem is undisturbed by anthropogenic factors, characterize their succession, and assess the effects of forest management strategies.

The Mycopins method involves placing wooden pins (hardwood and softwood) in the soilat four different sampling sites in a boreal forest in Finland: a swamp, a broadleaf forest, and a protected forest with and without access to reindeer, to monitor fungal colonization. Mycopins were collected biweekly (winter permitting) and analyzed using the metabarcoding method. This research focused the analysis of saproxylic fungi collected in a protected forest area inaccessible to reindeer, coniferous forest protected from reindeer and a broadleaf forest ecosystem, and DNA was extracted from each sample, amplified using PCR, purified, and sequenced using next-generation sequencing.

The research emphasizes the critical ecological function of fungi in boreal forests, providing data on the formation of saproxylic fungal guilds throughout the wood decompositionprocess, and their differences depending on the forest and wood type. Understanding saproxylicfungal guilds informs conservation practices, and sustainable management strategies. The MycoPins method represents a promising avenue for future ecological studies and enables a deeper understanding of the complex interactions that shape forest ecosystems.

TEN-YEAR UPDATE ON WATER LEAD LEVELS IN THE FLINT, MICHIGAN WATER CRISIS AFTERMATH

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The April 2014-October 2015 Flint, Michigan Water Crisis (FWC) was triggered by a source water switch from Lake Huron to the Flint River and an interruption of corrosion control treatment for lead (Pb). Cheating on regulatory sampling artificially lowered water lead levels during the FWC period. To circumvent these limitations, we employed a novel environmental surveillance approach assessing lead in sewage sludge or biosolids. These nutrient-rich wastewater treatment byproducts accumulate metals leached from domestic plumbing, including total lead released into drinking water. Our prior analyses for the 2011-19 period found a) a rise in water lead during the early FWC months that dropped thereafter and b) record-low lead in biosolids and water due to a switchback to Lake Huron water, lead pipe replacements, and optimized corrosion control. This study provides an update to the FWC for the 2019–2024 period, utilizing new biosolids data to assess trends in water and blood lead levels of Flint children under six years of age. Our findings provide new insights into the long-term effectiveness of post-crisis interventions and the utility of biosolids as a retrospective, cost-effective tool for tracking lead exposure in drinking water where official testing is insufficient or unreliable.

ANALYSIS OF THE PROBIOTIC EFFECTS OF THE NITROGEN-FIXING BACTERIUM *RHODOSPIRILLUM RUBRUM* ON THE GROWTH OF TOMATOSEEDLINGS

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With the increased global demand for food comes the increased use of chemical fertilizers. Although these chemical fertilizers are beneficial to increasing commercial crop yields, the excessive use of fertilizers is harmful to the environment. This study explores an alternate way ofenhancing the soil that nourishes plants without the damaging effects of artificial fertilizers.

Nitrogen is a vital element for plant growth, but it must first be converted into a usable form before plants can absorb and utilize it effectively– a process called nitrogen fixation. Nitrogen- fixation can be carried out by some bacteria. In this study, we sought to analyze if the addition ofthe nitrogen-fixing bacteria, *Rhodospirillum rubrum,* can be used to increase the growth of tomato plants. It was hypothesized that tomato seedlings would show increased growth rate in the presence of the bacterium. To test this hypothesis, 66 tomato seedlings were planted. The experimental group (33 plants) was inoculated with *R. rubrum,* while the control group (33 plants) received a sham-treatment of bacterial culture media without *R. rubrum.* All plants were given the same amount of water and kept under a regulated 12-hour light/dark cycle. Over the course of the experiment, germination date, plant height, leaf length, and leaf height were recorded every other day. While there was not a significant relationship between many of our variables and the experimental treatment, there was a trend towards faster germination rate and longer leaves in the first 90 days of the experiment. Our results suggest that while *R. rubrum* might increase some parameters of seedling growth, other candidates should be explored in tomato seedlings.

THE EMERGENCE OF ANTIBIOTIC-RESISTANT ENTEROCOCCI LOCATED IN STATEN ISLAND WATER

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Water quality testing is crucial in ensuring the lack of bacterial contamination to ensure that water is safe for consumption and recreation by humans. As Staten Island is surrounded by water, it is imperative that the body of water be tested to guarantee clean water for recreational use, drinking, and ecological systems. Contaminants from sewage or storm runoff may introduce harmful bacteria such as enterococci into local water. Generally, *Enterococcus* species are Gram-positive nosocomial pathogens that naturally live in our microbiomes and have recently emerged as carrying antibiotic-resistant genes. *Enterococcus* species are highly associated with aquatic environments as water may promote the spread of antibiotic resistance genes via mobile genetic elements. In this study, we tested water samples from three different locations on Staten Island for *Enterococcus faecalis* to determine whether they were resistant to vancomycin and other antibiotics. It is hypothesized that water samples collected close to Staten Island University Hospital will have higher antibiotic resistance due to wastewater runoff from the hospital. From April–December of 2024 30 water samples were collected. Water samples were collected from three locations: Conference House Park, Lemon Creek Park, and Wolfe's Pond Park. The Most Probable Number (MPN) test was used to identify water sources with a high likelihood of fecal coliform contamination. Next, enterococci were selectively cultured via BBL Enterococcosel tubes. From the positive enterococcosel tubes, 16 isolates were used to test for antibiotic resistance. Contrary to our initial hypothesis, only isolates from Wolfe's Pond Park were resistant to vancomycin, while the two locations had isolates resistant to the sulfonamide trimethoprim-sulfamethoxazole. Understanding the distribution of antibiotic-resistant bacteria can help manage recreational swimming and create awareness to mitigate bacterial risks in Staten Island's waterways.

UBC PRIMER 810 AS A TOOL FOR DETERMINING GENOTYPIC DIVERSITY OF *AMMOPHILABREVILIGULATA* (AMERICAN BEACHGRASS) IN NEW JERSEY COASTAL DUNES

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New Jersey's coastal dunes provide habitat and infrastructure protection along the state's coast. Restoring New Jersey's coastal dunes involves single-genotype plantings of the'Cape' variety of American Beachgrass (*Ammophila breviligulata*) for dune stabilization . However, it is questioned whether single genotype plantings provide long-term sustainability and ecosystem function. A baseline of native diversity in New Jersey populations of *A. breviligulata* was established using Inter-Simple Sequence Repeat (ISSR) markers, demonstrating high genotypic diversity in three native foredune populations, and moderate diversity in the single mid-dune population (Slaymaker et al., 2015).

Here, ISSR markers are being used to measure genotypic diversity across a successional gradient, from fore-dune to rear-dune in a New Jersey dune system from Sandy Hook Unit, Gateway National Recreation Area, on property belonging to US Coast Guard Auxiliary Flotilla 22. Genomic DNA preparations of 60 mid-dune samples and initial ISSR results for UBC Primer 810 are presented. This work represents the UBC Primer 810 portion ofa study that will eventually include ISSR analysis with 6 primers total and will generate a greater understanding of *A. breviligulata* biology that may influence future dune restoration efforts.

LIFE CYCLE ASSESSMENT (LCA) MODEL OF CO-LOCATED FLOATING SOLAR AND OFFSHORE WIND PLATFORMS

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Is combining floating solar and offshore wind platforms feasible for increasing energy capacity while displacing the environmental impacts that each of these systems has independently? In recent years offshore wind has become a very popular option to decarbonize the energy sector without overtaking valuable land. While floating solar is not a new technology, using solar in a marine environment is still in an experimental phase. This research proposes a Life Cycle Assessment (LCA) model of co-located solar technology within the proposed offshore wind farms near New Jersey's coastline. While both technologies themselves are zero-emission while operating, they each require a lot of energy and materials to be produced, during the process of which carbon emissions are released. New Jersey has many offshore wind projects developing since it has a long coastline along with the government's aim to produce 11 gigawatts of renewable energy by 2040. Co-located floating solar and offshore wind platforms can be an effective way of limiting environmental impacts associated with construction, displacing carbon-intensive fossil fuels, and meeting renewable energy goals.

VALIDATION OF A RAPID TEST STRIP ASSAY TO DIAGNOSE METABOLIC HEALTH IN CORALS

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Reef-building corals, while covering less than 1% of the seafloor, harbor over 25% of marine life on the planet. Rising ocean temperatures have intensified coral bleaching events—characterized by the loss of symbiotic algae—threatening reef survival globally. Current diagnostic methods for coral health are often expensive and require specialized laboratory equipment, creating barriers to timely intervention. This is a particularly challenging issue because coral reefs are largely found in global regions with limited resources that are disproportionately affected by climate change. Therefore, it is important to develop inexpensive and portable tools to detect thermal stress in coral populations to inform local reef management decisions. The Bhattacharya Lab has developed a novel toolkit using existing Accustrip® URS 10 Reagent Strips designed to robustly diagnose human health, a 3D-printed smartphone holder, and YOLOv8 image processing software to detect physiological responses in coral tissues. Previous studies investigating the utility of Urinalysis strips to rapidly assay coral health in the field have found correlations between Red/Green/Blue values on Leukocyte, Blood, and Ketone markers that distinguish thermally stressed and unstressed corals.

Our project aims to systematically validate these biomarkers using gold-standard experimental assays with five ecologically important, globally distributed reef building corals(*Montipora digitata, Porites* sp.*, Acropora florida, Pocillopora acuta,* and *Stylophora pistillata*). The Leukocyte (esterase activity) and Blood (peroxide activity) assays will be validated with colorimetric assays using spectrophotometry, whereas the Ketone (β-hydroxybutyrate) assay will be validated through quantitative metabolomics. In addition, we aim to establish standardized curves at biologically relevant concentrations for each of these test strip assays to improve sensitivity and specificity, enabling us to differentiate biologically relevant differences between metabolically stressed and healthy coral samples. The validation of Urinalysis test strips as a measure of coral health will provide an expedient and inexpensive testing platform for assessing coral stress responses in the field, with important implications for conservation efforts.

ASSESING HABITAT SUITABILITY OF EASTERN RED BAT IN NEW JERSEY

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Understanding processes affecting biodiversity is crucial to its conservation around the world. This is especially important in urbanized environments such as North New Jersey, where rampant conversion and fragmentation of natural habitats have emerged as potential reasons for biodiversity decline in terrestrial ecosystems. To better understand the effects of habitat suitability on the bat populations in New Jersey, we created a suitability model based on world climate data and occurrences of *Lasiurus borealis* across the United States. The model showed North New Jersey may not be a highly suitable region for this species due to the extensive urbanization and relatively low number of recorded occurrences in the area. Despite predictions indicated by the model, our field studies using passive acoustic monitoring confirmed the presence of *Lasiurus borealis* at Meadowlands Research and Restoration Institute and Rutgers University – Newark campus. Our findings suggest that, while urban landscapes create challenges for wildlife, *Lasiurus borealis* exhibit resilience and adaptability in response to human-induced environmental changes. The presence of green spaces within the urban landscape plays a crucial role in providing necessary habitats for bats, allowing them to persist in low suitability landscapes.

ANALYZING THE EFFECTS OF TRICLOSAN ON THE EGG LAYING SYSTEM IN *C. ELEGANS*

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Triclosan (TCS) is an endocrine disrupting chemical containing antibacterial properties. It used to be found in many everyday items like toothpaste and dish soap. TCS exposure impairs mobility and embryonic development, as well as immunity and endocrine system function in multiple organisms. We are interested in characterizing the effect of TCS on the function of the egg laying system in *Caenorhabditis elegans*, a nematode model organism. Published reports show TCS affects egg production when administered in early larval stages, suggesting the chemical may specifically alter the development of *C. elegans* egg laying system. We wanted to determine whether TCS affected the function of the cells involved in egg laying.

We observed the effect of TCS on egg laying behavior through an egg in worm assay, and egg production through a brood size assay. To conduct the egg in worm assay, we counted the number of eggs retained inside the uterus at the peak of egg production. After 24 hours of TCS exposure, there were fewer eggs retained in TCS-treated groups. After 48 hours of TCS exposure, the number of retained eggs was reduced for all groups, and the effect of TCS was not significant. Fewer egg retained means that the eggs were either not being produced or that the eggs were not being held in the uterus and were being laid quickly after fertilization. Because we cannot distinguish between these two options in an egg in worm assay, we conducted a brood size assay to measure egg production after TCS exposure. Worms were left to lay eggs for three days after TCS exposure at the L4 stage. The number of eggs produced by each worm was counted. Our data suggest that egg production is not reduced after 24 hours of TCS exposure, but is after 48-hours of exposure. TCS is reducing the number of eggs retained in the uterus at least by reducing egg production.

THE EFFECTS OF Dα7 ON PROGRESSION OF ALZHEIMER'S DISEASE IN AN Aβ42 *D. MELANOGASTER* MODEL

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In 2023, 55 million cases of Alzheimer's disease (AD) were reported worldwide and this number is expected to double by 2050. AD is a complex disorder, meaning that there are many genetic, environmental, and lifestyle factors that contribute to its development. One of several hypotheses, the amyloid-beta (Aβ) protein hypothesis proposes that an accumulation of toxic Aβ plaques within the brain causes progressive neurodegeneration, leading to reduced lifespan, locomotion problems, and dopamine loss, among other symptoms. Aβ42, a version of the Aβ protein containing 42 amino acids, is highly prone to aggregation and has a strong connection to the development of AD. Previous research has shown that in humans, one of the subunits of the nicotinic acetylcholine receptors (nAChRs), α7, colocalizes with Aβ42 in the neural plaques. nAChRs are activated by acetylcholine and mediate a broad range of normal neurotransmission processes. Aβ42 binds to α7 to form a complex, likely causing receptor dysfunction and potentially increased progression of AD symptoms. *Drosophila melanogaster* is a good model organism in which to study AD, as transgenic expression of human Aβ42 proteins causes AD symptoms similar to those in humans. Moreover, *D. melanogaster* Dα7 is homologous to the human α7 protein, and Aβ42 may be able to form a similar inhibitory complex with Dα7. Model organism research that examines the potential interactions between Dα7 and Aβ42 can help reveal how these proteins affect AD symptom progression. The purpose of the current study is to observe AD symptom progression at various ages through Aβ42 immunostaining, longevity, locomotion, and sleep assays in male and female *D. melanogaster* with overexpression of Aβ42 and Dα7. Ultimately, this is to see if and to what extent Dα7 causes AD progression to worsen over time. Overexpression of these proteins was done using the GAL4-UAS system. This work may provide additional insight into the effects of the human α7-Aβ42 complex. With the rapid increase of AD worldwide, more research is necessary to find out more information about this disease and to combat it.

EXAMINING THE BIOLOGICAL BASIS OF PRENATAL STRESS-INDUCED HYPERACTIVITY BEHAVIOR IN *DROSOPHILA MELANOGASTER*

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Exposure to prenatal stress has been shown to impact parents' offspring negatively. Research has associated prenatal stress with various mental health conditions such as anxiety, depression, and attention deficit hyperactivity disorder (ADHD). The underlying mechanism is largely attributed to disruptions in brain development due to prenatal stress exposure. *Drosophila Melanogaster* is a promising model for this experiment, displayed by its small size and high reproductive rate. This study dives into the behavioral outcomes of prenatal stress, such as circadian and malnutrition stress. While the prenatally stressed progeny did not manifest anxiety-like behaviors, they displayed increased locomotor activity through higher movement speed and greater distances travelled, suggesting hyperactive behaviors. In *Drosophila*, serotonin is a major neurotransmitter that contributes to locomotive behaviors through modulating spinal network activity. In fact, hyperactive behaviors were mitigated in prenatally stressed flies by using selective serotonin reuptake inhibitors (SSRIs) to prevent serotonin reuptake and increase its synaptic availability. While prenatal stress-induced hyperactivity is mediated through serotonin transmission, this leaves the open-ended question of the potential upstream signals that modulate serotonin. Dopamine, a neurotransmitter associated with reward and motion, may also contribute to ADHD, a condition characterized by hyperactivity, similar to the behavior seen in the prenatally stressed flies. Further research is needed to elucidate the interaction between serotonin, dopamine, and prenatal stress.

Understanding how prenatal stress impacts organisms behaviorally and biologically can further contribute to the world of medicine and neuroscience, furthering strategies to tackle various neurodevelopmental disorders.

THE EFFECT OF ELECTRICAL STIMULATION ON CIRCUMNUTATION OF ARABIDOPSIS THATIANA SHOOTS

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Circumnutation is a plant movement exhibited by rhythmic swaying patterns in plant appendages. This study examines the circumnutation patterns observed in Arabidopsis thaliana shoots in response to electrical stimulation at 2V, 5V, 10V, 15V, 20V, and 25V. Time-lapse cameras were used to capture the movement for further analysis through tracking software for detailed motion analysis to assess whether increasing degrees of electrical stimulation altered the amplitude and frequency of circumnutation. Prior studies have established that circumnutation in Arabidopsis thaliana is influenced by gravitropism and auxin transport, with Arabidopsis thaliana displaying altered movement patterns under different environmental cues (Kitazawa et al., 2005). Auxin signaling, specifically mediated by AUX/LAX influx transporters (Péret et al., 2012), is crucial in regulating growth-related movement patterns. The findings suggest that external electrical stimulation delivered may interact with these mechanisms, by possibly altering ion channel activity and auxin distribution. Results indicate that increasing electrical stimuli negatively influences the rhythmic swaying patterns in Arabidopsis thaliana shoots. These findings can potentially be a starting point for further exploration of the relationship between internal electrical signaling and circumnutation.

CELL MIGRATION OF EPITHELIAL BREAST CANCER CELLS UNDER ETHANOL EXPOSURE IN A SCRATCH ASSAY

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Alcohol consumption is linked to increased risk and aggressiveness of breast cancer. Althoughhigh concentrations of alcohol can lead to cytotoxicity of breast cancer cells, lower concentrations of alcohol can disrupt the extracellular matrix (ECM) of cancer cells to cause dissociation and migration. This project was intended to observe and quantify breast cancer cells in media supplemented with ethanol in order to determine the effect of ethanol on cell migration. Published reports support that doses of ethanol at concentrations below 100 mM will increase the migration of MCF-7 cells without significant cytotoxicity.

In this experiment MCF-7 cells incubated in RPMI medium on gridded 60 mm tissue culture plates over 48 hours to reach confluency. The plates were refed with RPMI supplemented with concentrations of ethanol and the scratch assay was performed in triplicate. The scratches were observed and imaged at 24 hour intervals over 72 hours to examine migration of cells onto the wound. Measurements of the change in distance were recorded to determine the effect that ethanol concentration had on migration.

COMPARATIVE 30-DAY STROKE OUTCOMES FOLLOWING TRANSCATHETER VERSUS SURGICAL AORTIC VALVE REPLACEMENT IN LOW-RISK PATIENTS: A META-ANALYSIS

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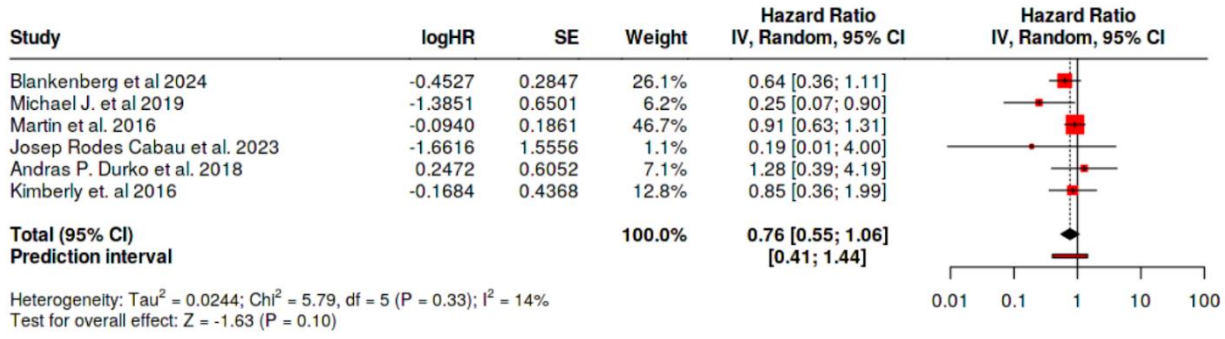
Background: Transcatheter aortic valve replacement (TAVR) has emerged as an alternative to surgical aortic valve replacement (SAVR) for low-risk patients with severe aortic stenosis. Given that perioperative stroke—defined as any ischemic or hemorrhagic stroke confirmed by imaging or clinical diagnosis within 30 days post-procedure—remains a critical adverse event affecting both short- and long-term outcomes, a rigorous comparative evaluation of stroke risk between these modalities is warranted.

Methods: A comprehensive literature search of MEDLINE (PubMed), Embase, the Cochrane Library, and ClinicalTrials.gov was conducted from inception to November 2024 to identify relevant randomized controlled trials (RCTs) comparing TAVR with SAVR in low-risk patients. Six RCTs met the inclusion criteria. The primary endpoint was the 30-day perioperative stroke rate. For studies with zero events, a continuity correction of 0.5 was applied. Effect sizes, expressed as log hazard ratios (logHR) with corresponding standard errors (SE), were pooled using an inverse-variance weighted random-effects model. Heterogeneity was assessed via Tau^2, Chi^2, and I^2 statistics, and a prediction interval was computed.

Results: The pooled analysis of six RCTs revealed a hazard ratio of 0.76 (95% CI: 0.55–1.06, p = 0.10), indicating a non-significant trend toward a lower risk of perioperative stroke with TAVR compared to SAVR. Heterogeneity was low (I^2 = 14%; Tau^2 = 0.0244; Chi^2 = 5.79, p = 0.33), with a prediction interval of 0.41 to 1.44.



Conclusion: In this meta-analysis of six RCTs, TAVR demonstrated a modest, non-significant trend toward reduced perioperative stroke risk compared to SAVR in low-risk patients. While the findings suggest potential benefits of TAVR regarding stroke prevention, the lack of statistical significance underscores the need for further studies with extended follow-up and additional clinical endpoints to refine patient selection and optimize treatment strategies.

EFFECTS OF POLYETHYLENE TEREPHTHALATE (PET) NANOPLASTICS ON THE STEROIDOGENIC PATHWAY IN MOUSE OVARIAN FOLLICLES

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For over a century, plastic has been in mass production and is now a major cause of environmental pollution. Plastics break down in the environment and can form nanoparticles, known as nanoplastics (NPs). NPs have been found to enter the human body and it is suspected that they can interact with normal bodily functions and affect human health. This research looksinto the effect of secondary polyethylene terephthalate (PET) nanoplastics generated from a plastic bottle on mouse ovarian follicles. Our focus is on the steroidogenesis pathway which is responsible for producing sex steroid hormones in the ovary. Our previous studies found that polystyrene (PS) NPs caused abnormalities in gene expression in this pathway, particular in the *Star* (Steroidogenic acute regulatory protein), *Cyp19a1* (Aromatase), and *Hsd3b1*,
(Hydroxy-delta-5-steroid dehydrogenase, 3 beta- and steroid delta-isomerase 1) genes along with downregulation of a crucial precursor hormone, pregnenolone. We hypothesize that PET NPs in environmentally relevant doses will cause a similar effect on the steroidogenesis pathway. To testthis, we conducted quantitative polymerase chain reaction (qPCR) to assess gene expression in murine ovarian tissue cultured in 0.05% Tween20 (vehicle control) or PET NPs at different dosesfor 96 hours. The doses were as follows: control, 0.1 µg/mL, 1 µg/mL, and 10 µg/mL. After the culture was complete, RNA was isolated and reverse transcribed to cDNA for the qPCR reaction.Hormone levels were measured in culture media via enzyme-linked immunosorbent assay (ELISA). We found down regulation in the Cyp17a1 (Cytochrome P450 17A1) gene in the 10 µg/mL treatment compared to the control. Pregnenolone levels were found to be up-regulated in the 10 µg/mL treatment group compared to the control. *Cyp17a1* is an essential enzyme which regulates the conversion of pregnenolone into steroid hormones eventually leading to the production of testosterone and estrogen, suggesting that disruption causes cascading effects down the steroidogenic pathway. This research gives us a better understanding of the consequences that excessive plastic use can have on human health.

EFFECTS OF E-CIGARETTE LIQUID FLAVOR ADDITIVES ON ATDC5 CHRONDROCYTE FUNCTION AND GENE EXPRESSION

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In 2024, 1.63 million students in middle and high school in the U.S. self-reported e-cigarette use. Frequent e-cigarette use has been shown to have detrimental effects on the cartilaginous tissue of the trachea and bronchi, as well as the respiratory system as a whole. While the effects of nicotine on chondrocytes are well documented, the effects of e-cigarette flavor additives are less so. This is especially concerning considering that a significant amount of adolescent vape users use nicotine-free products, perceiving them as healthier. In this study, we investigated the effects of various nicotine-free e-juice flavoring treatments at varying concentrations on ATDC5 chondrocyte viability, calcium deposition, proteoglycan content, and gene expression. Among those tested, menthol and cinnamon flavorings showed significantly decreased cell viability when compared to the control (growth media only). Additionally, both menthol and cinnamon-treated cells showed decreased concentrations of calcium deposits & proteoglycan levels. mRNA from cells treated with flavor additive solutions for a 24-hour period were isolated and quantified. This mRNA underwent reverse transcription to yield a cDNA product, with all products being verified via PCR and agarose gel electrophoresis. Reverse transcription of all samples is currently ongoing, but future qPCR to assess expression of collagen 2a1, collagen 10a1 as well as inflammatory markers like COX-2 are planned.”

HALICTUS LIGATUS HAS DECREASED MORPHOLOGICAL VARIABILITY AND NARROWER HEAD SHAPE IN NEWJERSEY BROWNFIELDS

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With the increasing amounts of pollution in natural spaces and the decline of native bee populations, it is essential to understand how native bee populations respond to environmental contamination. This study investigates morphological differences in the primitively eusocial, ground-nesting, native bee species, *Halictus ligatus*, between brownfields and greenfields in New Jersey. Brownfields are abandoned commercial or industrial sites suspected of contamination, while greenfields are old agricultural sites that have yet to be developed or contaminated. We analyze female specimens collected between May and Augustof 2010, with brownfield specimens sourced from Liberty State Park and the Meadowlands, and greenfield specimens from Tatum Park, Watchung Reservation, and Big Brook Park. To assess how *Halictus ligatus* responds to New Jersey's polluted areas, we measure the intertegular distance (an indicator of body size), head width, and head length using linear morphometric techniques. We hypothesize that bees from brownfields will exhibit head shrinkage, which may be a marker of pollution-related developmental issues. Results indicate that the heads of brownfield specimens are narrower and that brownfield bees are less variable in their traits than specimens from more natural sites. Narrower heads may be explained by habitat differences or potential exposure to heavy metal pollution causing developmental issues. Decreased variability in the body and head size of brownfield bee populations may be due to increased habitat homogeneity, increased competition for resources leading to uniform provision sizes, or differences in sociality between bee populations.

EFFECT OF MICROPLASTICS ON DEVELOPING ZEBRAFISH CAUDAL FIN REGENERATION

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Plastics are a foundational material in many disposable products, leading to the exponential growth of microplastic and nanoplastic (MNP) pollution around the world. MNP pollution concerns continue to increase where it has been found in food in our diets, water, and atmosphere. In the marine environment, animals have been found ingesting these particles due to high concentrations of MNP in feeding environments. Previous research from our lab has shown that microplastic polymethyl methacrylate (PMMA) and polyethylene terephthalate (PET) have inhibitory effects on the development of zebrafish such as pericardial sac size and interocular distance. The goal of this study is to observe the effect of the microplastics PMMA, PET, and polyamide (PA) on the regeneration of the zebrafish caudal fin. By examining the regeneration ofthe zebrafish caudal fin, we are able to measure the effects of MNP toxicity on cell proliferation under a variety of concentrations of select MNPs by measuring the re-growth of the caudal fin using before and after images. PMMA, PET, and PA were chosen as they are key components ineveryday products, such as fabrics, packaging materials, smartphone screens, etc. To test these impacts, zebrafish embryos (two hours post fertilization) were anesthetized and the caudal fins were amputated. The embryos were then exposed to solutions containing PMMA, PET or PA at three different concentrations (0.1µg/mL, 1.0µg/mL, and 10.0µg/mL) where the caudal fin regeneration was observed and quantified over two days. Exposure to PA did not show a meaningful difference in the regeneration of the caudal fin, however exposure to PMMA and PET showed an inhibition on the regeneration of the caudal fin.

DETERMINING THE EFFECTS OF TRICLOSAN ON *C. ELEGANS* LOCOMOTOR FUNCTION

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Triclosan (TCS), a synthetic chemical compound widely used as an antimicrobial agent in consumer products such as soaps, deodorants, and cosmetics, has been shown in mice and zebrafish to disrupt calcium signaling by activating the ryanodine receptor, leading to altered muscle function and neurotoxicity (Fritsch et al., 2013; Cherednichenko et al., 2012). TCS also impairs *C. elegans* locomotion, but its mechanism of action in this model organism is not well understood.

In this experiment, we aimed to determine the site of TCS action by testing whether it alters sensitivity to drugs that affect acetylcholine (ACh) signaling. *C. elegans* locomotion is regulated by excitatory neurotransmitter ACh, which promotes muscle contraction, and inhibitory neurotransmitter GABA, which reduces it. Worms were exposed to aldicarb, an acetylcholinesterase inhibitor, and levamisole, an acetylcholine receptor agonist.

Worms were treated with different doses of TCS for 24 hours during the late larval stage. Responses to the paralytic compounds aldicarb and levamisole were measured at fifteen-minute intervals over the course of two hours. The results revealed that TCS-treated worms exhibited aldicarb hypersensitivity, showing accelerated paralysis. This suggests that TCS may enhance ACh signaling at the neuromuscular junction by increasing ACh release, reducing ACh breakdown, or enhancing postsynaptic ACh signaling. TCS may also reduce GABA signaling. In contrast, TCS-treated worms displayed resistance to levamisole, with delayed paralysis, indicating impaired postsynaptic receptor function or altered sensitivity to ACh. These findings suggest that the effects of TCS on aldicarb and levamisole sensitivities were not statistically significant. High variability between drug response trials may have confounded our ability to detect a change in responses to these drugs.

USING A FUNGICIDAL ASSAY TO ASSESS SEASONAL VARIATION IN PLASMAANTIFUNGAL ACTIVITY OF RUBBER BOAS (*CHARINA BOTTAE*)

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To understand the seasonal susceptibility of ectotherms to disease, we must know howhost immune function can vary depending on season and temperature. In particular, ophidiomycosis (snake fungal disease) represents a conservation threat to North American snakes, and may be more prevalent in winter due to reduced host body temperature and suppressed immunity. However, research is limited on how seasonal change influences antifungal immunity of snakes. In this study, we used a fungicidal assay to quantify plasma antifungal activity in a laboratory population of Rubber Boas (*Charina bottae*), a winter-hibernating snake from western North America, as a functionof season and acute temperature. We collected plasma samples from Rubber Boas prior to and during hibernation, and performed a fungicidal assay against yeast (*Saccharomyces kudriavzevii*) across two different incubation temperatures (7 and 27°C). We predicted that plasma antifungal activity would be suppressed during winter and at the lower incubation temperature. Contrary to our predictions, statistical analysis using a two-way repeated-measures ANOVA revealed no significant effects of season, incubation temperature, or their interaction on plasma fungicidal activity. Moreover, plasma fungicidal activity did not differ significantly from zero for any combinations of season and incubation temperature. These results suggest that, under the tested conditions, seasonal changes and acute temperature fluctuations do not significantly alter the antifungal properties of Rubber Boa plasma. Future studies will investigate antifungal immunity using whole blood samples rather than plasma to account for the contributions of immune cells. Whole blood assays could provide a more comprehensive assessment of immune function by incorporating cellular responses (e.g., phagocytosis), potentially revealing seasonal or temperature-dependent changesthat were not detectable in plasma alone. This approach may offer additional insights into the immune strategies of hibernating reptiles and their ability to resist fungal infections across different seasons.

ADSORPTION OF CARBON DIOXIDE AND BENZOIC ACID ON ACTIVATED CARBONS PRODUCED FROMCASHEW NUT SHELLS BY UREA MODIFICATION AND POTASSIUM CARBONATE ACTIVATION

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Activated carbons were synthesized from cashew nut shells through various ratios of urea modification and potassium carbonate (K_2CO_3) activation, with activation temperatures ranging from 700℃ to 900℃. The goal was to calculate the adsorption capacities of benzoic acid (BA) and carbon dioxide (CO_2), investigate the influence of the modification parameters on the adsorption capacities of BA and CO_2 and the effect of surface chemistry and porosity on the adsorption capacities. Langmuir modeling was used to determine the adsorption capacity of BA,while thermogravimetric analysis was employed to assess the CO_2 adsorption properties. Potentiometric titration was performed to examine the surface chemistry of the synthesizedcarbons, and the iodine test was utilized to evaluate microporosity.

The results demonstrated that the sample activated at 900℃ exhibited the highest adsorption capacity for BA, which was attributed to its increased microporosity, enhanced graphitization, and negatively charged surface. These properties facilitated the adsorption of BA via π–π stacking and electrostatic interactions. The study also revealed that increasing the urea ratio anddecreasing the activation temperature to 700℃ led to an increase in microporosity and surface acidity, which in turn enhanced CO_2 adsorption through hydrogen bonding and electrostatic interactions. On the other hand, a higher K_2CO_3 ratio resulted in higher microporosity but reduced surface acidity, leading to a lower CO_2 adsorption capacity. These findings suggest that the activation temperature, the ratio of urea and K_2CO_3 significantly affect the surface chemistry,microporosity, and adsorption performance of activated carbons, providing insights into the optimization of these materials for environmental and industrial applications.

CONTROLLED PRODUCTION OF PLGA NANOPARTICLES UTILIZINGMICROFLUIDIC TECHNIQUES FOR GLASS TRANSITION TEMPERATURE ANALYSIS

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Poly(lactic-co-glycolic acid) (PLGA) nanoparticles are excellent vehicles in drug deliverysystems because they can be tailored for specific needs, and they break down into lactic acid and glycolic acid, molecules already found in the body. In targeted drug delivery, vehicles cross biological barriers to reach specific cells, releasing the drug while leaving the rest of the body unharmed. Targeted drug delivery has many potential applications, notably in cancer treatment, as it would solve the issue of traditional treatments (such as chemotherapy and radiotherapy) harming both tumor cells and healthy cells. Resolving those deleterious effects would make treatments more effective and easier for patients.

However, a significant issue with this system is burst release, where a large amount of drug leaves the vehicle as soon as it enters the body, rather than the controlled, sustained release of drug at its intended destination. This wastes the drug and renders the treatment ineffective andeven toxic. The glass transition temperature (T_g)—where a molecule changes from a brittle, "glassy" state to a softer, rubbery state—plays a role. When the environmental temperature is above the T_g of the vehicle, the polymer chains are more flexible, allowing drug molecules to escape and causing a high release rate. Furthermore, T_g is affected by nanoparticle size, but the relationship between size and T_g of PLGA nanoparticles is under-researched, which makes drug release behavior difficult to predict. Thus, we want to measure the T_g of PLGA particles with different sizes, which requires the production of PLGA nanoparticles of varying diameters.

Surfactant is used to produce nanoparticles, but any residual surfactant left in the finished particles affects the measured T_g, creating a confounding variable. No traditional methods of PLGA nanoparticle synthesis can decouple surfactant concentration from T_g. Though we cannot efficiently make particles without surfactant, a microfluidics approach allows us to produce PLGA nanoparticles of different sizes with constant surfactant concentration, so we can determine how nanoparticle size alone affects T_g.

In the microfluidics setup, we varied the flow rate of the organic phase (PLGA and solvent) while keeping the aqueous phase (water and surfactant) flow rate constant to produce particles using different flow rate ratios. After collecting the nanoparticles produced, we used Nanoparticle Tracking Analysis (NTA) to determine particle size and distribution. Thus far, we have created nanoparticles ranging in average sizes of 124-164 nm, and future work continues to expand this size range. Continuing goals are to adjust additional microfluidics parameters (such as PLGA concentration and total flow rate) to produce more nanoparticles of varying diameters, allowing us to reveal the effect of PLGA particle size on T_g. This is crucial information for designing PLGA nanoparticles to control for burst release, helping us produce functional targeteddrug delivery systems with the ability to more effectively treat diseases such as cancer.

FABRICATION OF SUPERHYDROPHOBIC/SUPEROLEOPHILIC SPONGES FOR OIL SPILL CLEANUP

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Oil spills in oceans pose a significant environmental threat, causing widespread pollution. However, traditional cleanup methods often face challenges such as secondary pollution and low efficiency. In this study, we aim to develop superhydrophobic and superoleophilic sponges as an effective and environmentally friendly alternative for addressing oil spill contamination.

Upon comparison between polyurethane (PU), melamine, cellulose, and sea sponge, melamine sponge demonstrates superior oleophilicity and modificable characteristics. We then employed various surface modification techniques to increase the hydrophobicity and improve the oleophilicity of melamine sponges. A series of metal ions were screened, and the water contact angles (WCAs) of the metal-modified sponges were measured to evaluate their water-repelling capabilities. Among the metal ions tested, Fe^{3+} and Al^{3+} showed the best results. We wanted to integrate various nanoparticles into the sponge to improve oleophilicity by increasing the surface area. However, we were losing the NPs upon rinsing. Through the addition of egg whites, we were able to chelate the Graphene Oxide nanoparticles (GONPs). Thus, the prepared sponge showed excellent selective absorption to oil while completely repelling water. The process of optimizing the properties through various combinations is ongoing.

In conclusion, the modified superhydrophobic and superoleophilic sponges offer a promising and sustainable solution for efficient oil spill cleanup.

THERMO-RESPONSIVE HYDROGEL SYSTEM FOR EFFICIENT DRUG DELIVERY THROUGH TOPICAL APPLICATION

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The integration of smart devices into our daily lives has transformed various fields, including medicine. Smart hydrogels, with their tunable physical properties and stimulus-responsive behaviors, have emerged as a promising platform for controlled drug delivery. In this study, we aim to develop a thermo-responsive hydrogel system for the self-regulated topical delivery of drugs to treat skin inflammation.

As a model drug, we first selected methylene blue (MB), a well-known anti-inflammatory antioxidant. MB-loaded natural gelatin hydrogels with upper critical solution temperature (UCST) thermosensitivity were prepared by incorporating MB, polyols (glycerol, xylitol, and sorbitol), and type A gelatin. UV-Vis absorption measurements of MB permeated into water indicated that the hydrogel's phase transition temperature could be adjusted by varying the amounts of glycerol, xylitol, or sorbitol. This was further confirmed by a pig skin staining experiment, where drug release kinetics were analyzed based on the blue stain left on the skin using a color contrast checker app.

Astaxanthin (ASTA), selected for its exceptional anti-inflammatory properties, was encapsulated in nanostructured lipid carriers (NLCs) to improve bioavailability, stability, and skin penetration. Incorporating ASTA-loaded NLCs into UCST hydrogels for autonomous drug delivery is currently underway.

In conclusion, this thermo-responsive hydrogel system shows great potential for efficient and controlled topical drug delivery, offering a promising solution for skin inflammation treatment.

FLUORESCENT DYED NANOPARTICLES FOR BIOLOGICAL IMAGING IN CANCER CELLS

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Current challenges in cancer research include issues with toxicity, biocompatibility, and their interactions within the body, which are all currently hindering their clinical applications. By implementing more biologically safe materials like using biologically compatible dyes, silanes, and metals as well as methods such as performing dialysis; one can help combat this current hindrance that scientists are currently facing. The purpose of this research is to synthesize biologically safe fluorescent dyed metal core – shell nanoparticles for applications in cancer cell research.

Silica – coated colloidal particles are a widely used class of materials that are desired for their vast surface functionality and tailorability. The improvement and the customizability of the size and shape of the core as well as the shell thickness and shape, allows one to create different surface interactions within the particle. Through the varying morphologies different applications can be targeted, for example these nanocomposites can improve semiconductor efficiency, catalysis, optical bioimaging and biological labeling. By synthesizing these nanocomposites that are optically magnified through plasmons allows them to be implemented to a widespread of applications. The addition of a fluorescent dye to coat the particles optically enhances the nanomaterials by absorbing and emitting wavelengths strongly within the visible spectrum. These dyes are tailored to bind to certain functional groups, or to specific biological materials. This allows the particles to be easily imaged, detected, and used as a drug delivery system when applied to cancerous cells.

References:

1. Chauhan, Bhanu P. S.; Sardar, Rajesh. “Self-Assembled Stable Silver Nanoclusters and Nanonecklace formation: Poly(Methylhydrosiloxane)-Mediated One-Pot Route to Organsols” Macromolecules 2004, 37, 14, 5136–5139, https://doi.org/10.1021/ma0496798
2. Chaudhuri Ghosh, Rajib. “Core/Shell Nanoparticles: Classes, Properties, Synthesis Mechanisms, Characterization, and Applications.” ACS Publications, https://pubs.acs.org/doi/full/10.1021/cr100449n
3. Saha, Krishnedndu. “Gold Nanoparticles in Chemical and Biological Sensing.” ACS Publications, https://pubs.acs.org/doi/10.1021/cr2001178
4. Christiana Graf. “A General Method to Coat Colloidal Particles with Silica.” ACS Publications, https://doi.org/10.1021/la0347859

COMPLIATION OF ANALYSIS ON DIFFERENTLY TAILORED SILANES AS WELL AS CO-POLYMERIZATION INVOLVEMENT

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Polymers have been demonstrated to be very useful for modern applications of materials. Polymerization and co-polymerization of diverse monomers allows for creating materials of unique optical, chemical, and mechanical properties.[1] It has been demonstrated that polymerization of silanes can create different arrangements of silicon atoms to provide new type of diblock copolymers, alternating copolymers, and/or graft copolymers.

In this research, we will present creation of polysilanes using differently sized platinum nano particles and platinum complexes as catalysts.[2] By studying these hybrid organic/inorganic silanes in presence of different catalysts we discovered that under optimized conditions can lead to co-polymerization, as well as, functional polymerization.[3] We found that the hydrosilanes acts as a reducing agent of the metallic catalyst creating nanometals in the size region of 5-10 nanometer range. The same polymerized silanes serve as steric hindering capping agents for the nanometals to prevent agglomeration. The NMR, IR, UV, and GPC analytical methods were applied to the study the polymerization of silanes such as: phenylsilane, p-tolylsilane, butylsilane, hexylsilane, octylsilane, dodecylsilane, octadecylsilane.

(1) B. P. S. Chauhan, J. S. Rathore, J. Am. Chem. Soc. 2005, 127, 5790–5791.
(2) H. G. Woo, T. D. Tilley, J. Am. Chem. Soc. 1989, 111, 8043–8044.
(3) Zeldin, M. Polymers, Inorganic and Organometallic. In *Encyclopedia of Physical Science and Technology (Third Edition)*; Meyers, R. A., Ed.; Academic Press: New York, 2003; pp 675–695. https://doi.org/10.1016/B0-12-227410-5/00947-9.

FORMIC ACID-MEDIATED SYNTHESIS OF RED CARBON DOTS

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Quantum dots (QDs) are semiconductor nanocrystals with broad applications in imaging, sensing, and drug delivery. Due to their exceptional fluorescence properties, in recent years they have been increasingly considered for their potential applications in the biomedical industry, andconsidered for applications in cell and deep-tissue imaging, biomarker detection, drug delivery with real-time drug tracking, and other targeted therapeutic methods. However, traditional QDs are often synthesized from heavy metals, raising toxicity concerns that limit their use in biological systems. As a safer alternative, carbon quantum dots (CQDs) have gained attention fortheir biocompatibility, low toxicity, and tunable fluorescence. This study aims to develop red-emitting CQDs, which are especially advantageous for biomedical imaging due to their deeper tissue penetration and reduced background interference. In this study, we report the successful hydrothermal synthesis of red-emissive CQDs using citric acid and urea as carbon andnitrogen sources, respectively, dissolved in formic acid with water as the solvent. The reaction was carried out in a Teflon-lined autoclave at 160 °C for 4 hours.

Fluorescence spectroscopy of the crude product revealed two primary emission peaks, corresponding to distinct CQD populations emitting in the blue and red regions of the spectrum.To enhance red fluorescence yield, we systematically investigated the influence of reaction time(3, 8, and 12 hours) on emission characteristics. The resulting samples were fractionated using column chromatography, allowing for the separation of distinct emissive species. Our results demonstrate that reaction time plays a critical role in tuning emission properties, enabling selective enrichment of red-emissive CQDs. This work contributes to the ongoing development of low-toxicity, red-emitting nanomaterials for biomedical imaging and related applications.

RHEOLOGY – A TOOL IN DETERMINATION OF CRITICAL PARAMETERS OF HYBRID MATERIALS

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Hybrid organic-inorganic "melting gels" are rigid at room temperature, but soften and flow repeatedly around 110ºC. Once these gels have been consolidated, they no longer show the ability to soften. These gels and the hybrid glasses resulting from them have potential to be used as hermetic barriers for electronics. Since the electronics are supposed to be employed in a wide range of temperatures, it is important to investigate the behavior of the melting gels at low temperatures. The rheological behavior at various temperatures was monitored by oscillatory rheometry measurements. At room temperature, the gels behaved as a viscous fluid, viscous modulus, G", being larger than the elastic modulus, G'. As the temperature moved on from room temperature, gels continued to behave as a viscous fluid, both moduli increasing with decreasing or increasing temperature, until they crossed each other. The crossover point at low temperature has been assigned to the glass transition temperature T_g, while the crossover at high temperature, to the consolidation point. The consolidation temperatures and the glass transition temperatures were determined and correlated with the gels' composition. Moreover, the evolution of the complex viscosity for the cooling cycle has been evaluated for all the gels and accounted for an Arrhenian model temperature dependence.

MORINGA-INFUSED HERBAL TEAS AS FUNCTIONAL BEVERAGES: ANTIOXITANT ACTIVITY AND PHENOLIC CONTENT EVALUATION

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Moringa oleifera, commonly known as the "miracle tree," is highly valued for its rich nutritional composition and potent antioxidant properties. This study evaluates the antioxidant capacity of six herbal tea formulations infused with Moringa and other bioactive botanicals. The total phenolic and flavonoid content of each sample was quantified and correlated with antioxidant activity, assessed through ABTS and DPPH radical scavenging assays. Results indicated that the original Moringa tea exhibited the highest flavonoid concentration, while Moringa blended with green tea contained the highest phenolic content. Notably, the Moringa and green tea formulation demonstrated the strongest antioxidant activity, suggesting synergistic interactions between Moringa's bioactive compounds and complementary herbal ingredients. These findings reinforce the potential health benefits of Moringa-based herbal teas, supporting their role as functional beverages for oxidative stress reduction and overall well-being.

EXTRACTION AND ANALYSIS OF NICOTINE FROM VARIOUS TOBACCO PRODUCTS

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Nicotine is a major alkaloid found in Nicotiana tabacum and various tobacco products, contributing to addiction and health risks. This study focuses on the extraction, isolation, and analysis of nicotine from different sources, including flue-cured tobacco, chewing tobacco, Virginia Gold tobacco, and germinated tobacco seeds, as well as e-cigarette products. Spectrophotometry is used to determine nicotine concentration by measuring absorbance at specific wavelengths, comparing results to a nicotine standard to identify products with the highest nicotine content. Additionally, thin-layer chromatography (TLC) and column chromatography (CC) are utilized for qualitative analysis, while a potential gas chromatography (GC) fluorescence method may be employed for further quantification. By examining nicotine levels across different sources, this research aims to provide insights into nicotine content variations and their implications for public health. While data collection is ongoing, this study establishes a foundation for future nicotine analysis and harm-reduction strategies.

DISCRIMINATION COFFEE VARIETIES USING FTIR SPECTROSCOPY AND PRINCIPAL COMPONENT ANALYSIS

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Coffee is one of the most widely consumed beverages globally, prized for its complex flavor, aroma, and origin-specific characteristics. The chemical composition of coffee is influenced by factors such as bean variety, geographic origin, roast level, and flavor additives. In this study explores the chemical diversity of various coffee samples through Fourier-transform infrared (FTIR) spectroscopy combined with principal component analysis (PCA). FTIR spectra of seven coffee types including French Roast, French Vanilla, and beans from Peru, Guatemala, Costa Rica, Brazil, and Colombia- revealed common functional group features such as C–H stretching near 2900 cm^{-1} and C=O stretching around 1700 cm^{-1}, with distinct variations in the fingerprint region (600–1500 cm^{-1}). These spectral differences reflect variations in roast level, origin, and potential flavor additives. PCA of the IR data captured 98.5% of the total variance across two principal components (PC1: 93.1%, PC2: 5.4%). The resulting score plot showed clear clustering of samples according to type, with minimal overlap for most groups, highlighting the ability of FTIR-PCA to differentiate coffee samples based on chemical composition. The tight clustering of certain origins (e.g., Brazil and Peru) suggests high within-group consistency, while the broader spread or overlap of others (e.g., French Vanilla and French Roast) may reflect variation due to flavor additives or roast intensity. These findings demonstrate the potential of IR spectroscopy combined with multivariate analysis for rapid coffee profiling, authentication, and quality control.

QUANTITATIVE ANALYSIS OF IRON CONTENT IN FORTIFIED CEREALS USING ATOMIC ABSORPTION SPECTROSCOPY

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Iron-fortified cereals serve as a key dietary source of iron, with manufacturers incorporating elemental iron into formulations to enhance nutritional value. This study aims to quantify and evaluate the accuracy of iron content in various commercially available cereal brands using Atomic Absorption Spectroscopy (AAS) and the Beer's Law Method. By comparing experimentally determined iron concentrations with manufacturer-stated nutritional claims, this research assesses the reliability of iron fortification and potential discrepancies in labelling. Fortified iron, upon ingestion, undergoes conversion to bioavailable ferrous iron (Fe^{2+}) in the stomach, a form of crucial for oxygen transport and metabolism. The AAS technique provides highly sensitive and precise measurements, enabling a detailed assessment of iron content variations across different brands. The results of this study will offer insights into fortification consistency, potential over- or under-reporting of iron content, and implications for dietary intake recommendations. These findings contribute to a broader understanding of nutritional labelling accuracy, food quality control, and consumer trust in fortified products.

INVESTIGATING THIAMINE FRAGMENTATION USING 2D NMR SPECTROSCOPY

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Thiamine (vitamin B1) is an essential coenzyme involved in enzymatic catalysis, but under certain conditions it can fragment into inactive components, resulting in the loss of its biologicalfunction. This project focuses on the synthesis and characterization of 2-(1-hydroxybenzyl)thiamin (HBzT), a compound previously identified as a possible intermediate in thiamine-dependent processes and known to undergo fragmentation in aqueous environments. A modified procedure based on existing literature was used to generate HBzT from thiamine and benzaldehyde under mildly basic conditions. Nuclear magnetic resonance (NMR) spectroscopy was used to evaluate the reaction outcome and to assess the structure and stability of the product. Analysis included both 1D and 2D NMR techniques such as HSQC, HMBC, TOCSY, and DOSY to investigate molecular connectivity and monitor any changes thatmight indicate fragmentation. The goal of this work is to determine whether HBzT can be reliably synthesized under these conditions and to explore how pH and other solution factors influence its potential degradation. This research contributes to a deeper understanding of thiamine reactivity in aqueous systems and may support future studies on coenzyme stability andfunction.

SYNTHESIS OF SILICA-METAL COMPOSITE NANOPARTICLES DECORATED WITH POLY-RHODANINE

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Metal composites of silica are a very promising class of nanomaterials, which have found applications in drug delivery, catalysis and optical materials. In this research poly-rhodanine conjugates of metal nanoparticles are being investigated. In this work, stable metal-silica nanoparticles decorated with poly-rhodanine were synthesized to examine their potential antimicrobial effect in bacterial cells studies. At room temperature, it was observed that when silica nanoparticles are mixed with other metal salts such as silver nitrate or silver acetate, it results in the deposition of silver ions on the surface of the silica nanoparticle. When rhodanine was added, the rhodanine monomer polymerized on the surface of the silica-silver composite nanoparticle. This was observed through electron microscopy, infrared spectroscopy, and ultraviolet-visible spectroscopy.

A SPECTROSCOPIC EVALUATION OF THE B TO A CONFORMATIONAL TRANSITION INDUPLEX DNA USING FLUORESCENT BASE ANALOGUES

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The transition of the standard B-form DNA helix to A-form DNA was first seen by X-ray imaging of DNA fibers in 1953. Over time, B and A DNA structures have been further characterized with many higher-resolution crystal structures. The transition of B-DNA double helix to A-form is essential for biological functions as recognized by the presenceof A-form DNA in many protein-DNA complexes. Recently, it was proposed that the shorter length of the A-form DNA compared to the B-form DNA might play an essential role in duplex DNA packaging in bacteriophages and that this conformational change might itself serve as the source of the large forces generated by the DNA packing motors.Even though it is known that the B to A conformational transition occurs, the specifics, like where in the DNA it originates, how it propagates, and the detailed step-by-step mechanism involved, whether mismatches and abasic sites influence the transition, are still unknown. We explored the local and global conformational changes in this highly biologically relevant transition using site-specifically positioned fluorescent oligonucleotides where 2-Aminopurine, the fluorescent base analogue of adenine, was site-specifically introduced. Our results showed that we could simultaneously monitor the local and global conformational change using 2-AP.

REGIONAL DIFFERENCES IN THE ANTIOXIDANT PROPERTIES OF UNITED STATES PROPOLIS SAMPLES

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Bee propolis, a bioactive resinous substance produced by bees, is widely used as a dietary supplement due to its antioxidant, antimicrobial, and anti-inflammatory properties. This study focuses on evaluating the antioxidant capacity of propolis, which is largely attributed to its phenolic and flavonoid compounds. Antioxidants play a crucial role in neutralizing free radicals, which are linked to chronic diseases such as cancer and cardiovascular disorders. To assess the antioxidant potential, propolis samples from various regions across the United States, including Alabama, California, Georgia, Hawaii, Kansas, Maine, Michigan, Minnesota, Mississippi, Ohio, and Washington, were analyzed using DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) assays. Additionally, the total phenolic content (TPC) was determined using the Folin-Ciocalteu method, and the correlation between phenolic concentration and antioxidant activity was established. The results revealed significant variability in antioxidant capacity among the propolis samples, demonstrating a strong association between phenolic content and free radical scavenging activity. These findings reinforce the potential health benefits of propolis and highlight the importance of regional variability in its bioactive composition.

GEOGRAPHICAL VARIABILITY IN THE ANTIOXIDANT PROPERTIES OF PROPOLIS FROM EUROPE

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Bee propolis, a bioactive resinous substance produced by bees, is extensively recognized for its antioxidant, antimicrobial, and anti-inflammatory properties, making it a popular dietary supplement. This study specifically examines the antioxidant capacity of propolis, largely attributed to its phenolic and flavonoid compounds, which play a crucial role in neutralizing free radicals associated with chronic diseases such as cancer and cardiovascular disorders. By employing DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) assays, alongside the Folin-Ciocalteu method to determine total phenolic content (TPC), propolis samples from various European countries
including Latvia, Serbia, England, Hungary, Lithuania, Poland, Russia, Portugal, Greece, Romania, the Czech Republic, and Bulgaria were precisely evaluated. The results revealed substantial variability in antioxidant capacity among these samples,demonstrating a strong correlation between IC50 inhibition and free radical scavenging activity, and therefore highlighting the potential health benefits of propolis while drawing attention to the importance of regional differences in its bioactive composition.

PROLINE SUBSTITUTIONS IN HIAPP: INHIBITING AMYLOID AGGREGATION IN TYPE 2 DIABETES

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Pancreatic islet amyloid polypeptide (hIAPP) aggregation is a substantial contributor to β-cell dysfunction in type 2 diabetes, triggered by the highly amyloidogenic NFGAILSS sequence. The formation of amyloid fibrils leads to cytotoxicity and β-cell death, making hIAPP aggregation a target for therapeutic intervention. Proline is an amino acid that has been identified to inhibit amyloid formation by introducing steric hindrance, restricting backbone flexibility, and restricting β-sheet propagation due to proline's rigid five-membered pyrrolidine ring. Proline's rigid five-membered pyrrolidine ring consists of a pyrrolidine ring, where the side chain is covalently bonded to both the α-carbon and the nitrogen of the amino group. This cyclic property of proline is useful in locking the peptide backbone, creating a rigid structure that imposes conformational constraints that disrupt fibril stability. This rigidity disrupts the peptide's backbone flexibility and limits hydrogen bonding capacity, which are key determinants in β-strand elongation and fibril formation, making proline an efficient amino acid in mitigating amyloidogenesis.

Previous studies have explored proline substitutions at the positions G3P, A4P, S7P, and S8P. However, there are sites within NFGAILSS that haven't been investigated and may offer additional amyloid inhibition by disrupting significant stabilizing interactions within the fibrillogenic core. Due to the fact that residues within this sequence contribute to β-sheet stabilization and hydrophobic packing, proline incorporation at alternative positions could sterically hinder aggregation pathways and destabilize fibril elongation. Thus, this study aims to synthesize and characterize new hIAPP analogs with targeted proline substitutions to determine their effects on amyloid fibril formation and stability. Solid-phase peptide synthesis (SPPS) will be used to generate the modified peptides and will precisely control the sequence, which will then be purified and examined to ensure consistency. Aggregation kinetics and structural changes will be assessed using Thioflavin T (ThT) fluorescence assays to monitor fibrillation rates, circular dichroism (CD) spectroscopy to analyze secondary structural alterations, and turbidity measurements to quantify peptide solubility and aggregation tendencies. These methodologies will identify the proline modifications that are effective in reducing amyloid formation while maintaining peptide function. Proline incorporation is anticipated to sterically disrupt β-sheet stacking, destabilize fibril interactions, and prolong the lag phase of aggregation, thus reducing cytotoxic amyloid species. This study also aims to advance the understanding of sequence-dependent amyloid inhibition and contribute to the development of aggregation-resistant hIAPP alternatives, aiding in the design of peptides for the treatment of type 2 diabetes.

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5	Felician University
6	Hokkaido University
7	Indiana University
8	Kean University
9	Lake Erie College of Osteopathic Medicine
10	Lanzhou University
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