Eastern College Science Conference

74th Annual Conference | April 8 - April 10, 2021

REMOTE CONFERENCE

The 74th annual conference logistics were handled remotely by Professor Anthony Kapolka from Wilkes University and Dr. Lance S. Evans from the New York Botanical Garden

History of the Eastern College Science Conference

The first Eastern Colleges Science Conference (ECSC) was organized in 1947 by undergraduate Pauline Newman at Vassar College in Poughkeepsie, New York. The aim then, as now, was to stimulate interest in undergraduate research in the sciences and related fields and to provide a lively forum for the presentation of research papers. Pauline Newman received her bachelor's degree in chemistry and went on to receive a Ph.D. in chemistry from Yale. About 22 schools attended the first conference, and the theme was "Science, Philosophy and Society."

The constitution of the ECSC was ratified on April 24, 1948 at Union College in Schenectady NY, making the conference a self-sustaining body.

In 1972 the Pennsylvania State University was named the repository for all official documents of the ECSC. Professor Stanley Shepherd was named the permanent secretary of ECSC. In 1980 Professor Shepherd stepped down and Professor Gerard O'Leary from Providence College was elected to the post. At the 35th annual conference a steering committee was established to assist in directing the activities of the ECSC.

In 1983 the ECSC was incorporated in Rhode Island and now operates with a Board of Directors, elected from faculty of the participating colleges and universities. In 1986 Professor Gerard O'Leary stepped down, and Professor Edward Gabriel of Lycoming College was elected Chair of ECSC.

In 1995, Professor Lance S. Evans of Manhattan College was elected chair of the board. In 2007, Dr. Michael Kotarski of Niagara University was elected to Chair of the Board of Directors, and in 2011 was succeeded by Dr. Donald Stearns of Wagner University. Dr. Stearns serviced until 2021 and Dr. Lance S. Evans of the New York Botanical Garden succeeded Dr. Stearns as Chair of the Board.

Interest has increased in the conference and over our 74-year history 50 colleges and universities have attended this annual event. Over time the range of subject matter has also expanded and now covers computer science and behavioral and social sciences, as well as the original areas of biology, chemistry, mathematics, physics and engineering.

Previous Eastern College Science Conference Meetings

1947: Vassar College, Poughkeepsie, NY
1948: Union College, Schenectady, NY
1949: Adelphi College, Garden City, NY
1950: Bernard College, New York, NY
1951: Yale University, New Haven, CT
1952: PA College for Women, Pittsburgh, PA
1953: N.Y. State College for Teachers, Albany, NY
1954: Brooklyn College, Brooklyn, NY
1955: Seton Hall University, South Orange, NJ
1956: Temple University, Philadelphia, PA
1957: Georgetown University, Washington, DC
1958: Wilkes College, Wilkes-Barre, PA
1959: Suffolk University, Boston, MA
1960: Hunter College, New York, NY
1961: SUNY College of Forestry, Syracuse, NY
1962: North Carolina State College, Raleigh, NC
1963: Boston College, Chestnut Hill, MA
1964: Jersey City State College, Jersey City, NJ
1965: Danbury State College, Danbury, CT
1966: D.C. Teacher's College, Washington, DC
1967: Fordham University, New York, NY
1968: Yale University, New Haven, CT
1969: Yale University, New Haven, CT
1970: Wilkes College, Wilkes-Barre, PA
1971: Rosary Hill College, Buffalo, NY
1972: U.S. Military Academy, West Point, NY
1973: Pennsylvania State Univ., University Park, PA
1974: Worcester Polytech. Institute, Worcester, MA
1975: Widener College, Chester, PA
1976: Rhode Island College Providence, RI
1977: Fairleigh Dickenson Univ., Rutherford, NJ
1978: Union College, Schenectady, NY
1979: Wilson College, Chambersburg, PA
1980: SUNY at Cortland, Cortland, NY
1981: Jersey City State College, Jersey City, NJ
1982: Lycoming College, Williamsport, PA
1983: Wilkes College, Wilkes-Barre, PA

1984: Providence College, Providence, RI
1985: SUNY at Fredonia, Fredonia, NY
1986: Duquesne University, Pittsburgh, PA
1987: Lycoming College, Williamsport, PA
1988: Ithaca College, Ithaca, NY
1989: U.S. Military Academy, WestPoint, NY
1990: Manhattan College, New York, NY
1991: SUNY at Fredonia, Fredonia, NY
1992: United States Naval Academy, Annapolis, MD
1993: Central Connecticut State University, NewBritain, CT
1994: Duquesne University, Pittsburgh, PA
1995: Ithaca College, Ithaca, NY
1996: Lycoming College, Williamsport, PA
1997: Central Connecticut State University, New Britain,CT
1998: Niagara University, Lewiston, NY
1999: Sacred Heart University, Fairfield, CT
2000: Wagner College, Staten Island, NY
2001: Wilkes University, Wilkes-Barre, PA
2002: Niagara University, Lewiston, NY
2003: Ithaca College, Ithaca, NY
2004: Manhattan College, Bronx, NY
2005: CentralConnecticutStateUniversity, New Britain, CT
2006: St.Joseph's University, Philadelphia, PA
2007: College of Mount St. Vincent, Bronx, NY
2008: Niagara University, Lewiston, NY
2009: Wagner College, Staten Island, NY
2010: Pace University, Pleasantville, NY
2011: Sacred Heart University, Fairfield, CT
2012: William Paterson University, Wayne, NJ
2013: Providence College, Providence, RI
2014: Marist College, Poughkeepsie, NY
2015: Niagara University, Lewiston, NY
2016: Western New England Univ., Springfield, MA
2017: Wilkes University, Wilkes-Barre, PA
2018: Ithaca College, Ithaca, NY
2019: Manhattan College, Bronx, NY
2020: Sacred Heart University, Conn.
2021: Remote

Full-Length Manuscripts Submitted For An Excellence Award

THE EFFECTS OF COCAO ON SPATIAL WORKING MEMORY IN RATS

Robert Fogle and Katherine Peake
Health Sciences

THE IMPACT OF CHRONIC PSYCHOLOGICAL TRAUMA ON MEMORY AND SOCIALIZATION IN RATS

Jamie Gatesman and Riley Justice
Psychology

HIGH THROUGHPUT CARBON NANOTUBE FIELD EFFECT TRANSISTOR ASSEMBLY FOR RAPID SENSOR DEVELOPMENT

Joshua R. Hughes
Physics

CLOCKS AND CAFFIENE: HOW TIME OF DAY IMPACTS ANXIETY IN LONG EVANS RATS

Haley Kovach and Karlee Schultz
Physiology

CHROMATOGRAPHIC ANALYSIS OF BEE PROPOLIS FROM DISTINCT SECTIONS OF THE UNITED STATES OF AMERICA

Lawrence Phillips
Chemistry

Conference Schedule

Poster sessions are held on April 8 and 9
Platform sessions are held on April 10
Plenum Presentation:
Saturday 10 April 12:15 to 12:45 PM
Title: Data Science Requires “Data” and Science”:
Applications in Chemical Manufacturing

Dr. Mary Beth Seasholtz, Dow, Inc., Midland, Michigan

Platform sessions

Biochemistry

1.Aimen Khurram, Miriam Duncan, Sarah Wacker PHD. Biochemistry Department Manhattan College, 4513 Manhattan College Pkwy, Riverdale, New York, 10471

THE ROLES OF TYROSINE KINASES IN BACTERIAL BIOFILMS

2.Franchesca Pepaj, Chemistry and Biochemistry department, Manhattan College, 4513 Manhattan College Pkwy, The Bronx, NY 10471

INVESTIGATING THE DEPENDENCE OF BIOFILM PHENOTYPES ON SPECIFIC GENES

3.Kimberly Heller, Stephanie Roberts, Dr. Bryan Wilkins PhD., Department of Biochemistry Manhattan College, 4513 Manhattan College Parkway, Bronx, NY 10471

UNDERSTANDING INTERACTIONS BETWEEN HISTONE DNA AND RPLS IN S. CEREVISIAE

4.Liam Sasser, Ryan Limbocker(PI), Department of Chemistry and Life Science, United States Military Academy, West Point, NY 10996, USA.

ATTENUATION OF CYTOTOXITY CAUSED BY PROTIEIN MISFOLDED OLIGOMERS USING SMALL MOLECULE COUNTERMEASURES

5.Rachel Mojica, Department of Chemistry and Biochemistry, Manhattan College, 4513 Manhattan College Pkwy, The Bronx, NY 10471

PURIFICATION AND CHARACTERIZATION OF THE PROTEIN KIND THAT IS INVOLVED IN BACILLUS SUBTILIS BIOFILM FORMATION

6.Ryan P. Kreiser, 2. Aidan K. Wright, under the supervision of Dr. Ryan Limbocker Department of Chemistry and Life Science, United States Military Academy, West Point, NY 10996, USA

QUANTIFYING THE CYTOTOXICITY OF TOXINS AND PROTEIN MISFOLDED OLIGOMERS AS A FUNCTION OF CELL MEMBRANE COMPOSITION

Chemistry

1.Davi Vanegas, Chemistry, Adelphi University, 1 South Ave, Garden City, NY, 11530

SYNTHESIS OF 2-(2-METHYLPYRIDIN-3-YL)PHENOL DERIVATIVES AS URIDINE NUCLEOSIDE RIBOHYDROLASE INHIBITORS

2.Gaia Fakhoury (1),Dr. Fan Jianwei (2), Dr. Wacker Sarah, Ryan Torres, Manhattan College Department of Chemistry and Biochemistry, Riverdale, New york, 10471

CHARACTERIZATION OF BACILLUS SUBTILIS BIOFILMS USING FLUORESCENCE SPECTROSCOPY

3.Erum Ajmal, Chemistry, Adelphi University. 1 South Avenue, Garden City, NY, 11530

Synthesis of phenyl pyridines, pyridazines and pyrimidines to test for their inhibition on the enzyme Uridine Nucleoside Ribohydrolase (UNH).

4.Kevin Nelson, Carlos Ventura, Edina Saljanin, Brian Stockman, Melissa VanAlstine-Parris. Department of Chemistry, Adelphi University, 1 South Ave, Garden City, NY 11530

SYNTHESIS OF PHENYL PYRAZOLES FOR THE INHIBITION OF UNH IN TRICHOMONAS VAGINALIS

Combined Session

1.Maya Carvalho-Evans, Biology, Manhattan College (4513 Manhattan College Pkwy, The Bronx, NY 10471)

REGENERATION OF CHAPARRAL SPECIES AFTER FIRES

2.Noah Bach, Sydney Scheck, & Jessica Wang. Psychology Department, Ithaca College, 953 Danby Rd, Ithaca, NY, 14850

BAD EDUCATION: A CONTENT ANALYSIS OF PORTRAYALS OF TEACHERS AND SCHOOL PERSONNEL ON TEEN SHOWS, SITCOMS, AND TV DRAMAS

3.Anil Venkatesh, Department of Mathematics and Computer Science, Adelphi University, 1 South Ave, Garden City, NY 11530 Viren Sachdev, Department of Mathematics and Computer Science, Adelphi University, 1 South Ave, Garden City, NY 11530

INTERNAL SYMMETRIES IN MUSICAL 12-TONE ROWS

4.Deirdre Franks Department of Biology, Manhattan College; 4513 Manhattan College Parkway Riverdale, New York 10471

BENDING STRESSES OF PRIMARY AND SECONDARY BRANCHES OF TREES

5.Olivia Daddio, Noy Kremer, and Alex Smith, Dept. of Psychology, Ithaca College, Ithaca, NY, 14850

SNAKE HABITATS VS. GLAMOUR TIPS: A CONTENT ANALYSIS OF GENDERED MESSAGES IN CHILDREN'S ACTIVITY BOOKS

6.Sharifa Kelly; Carl Hoegler Ph.D, Natural Sciences (Biology), Mount Saint Mary College (330 Powell Ave, Newburgh, NY 12550)

THE EFFECTS OF ORTHO GROUND CLEAR (AMMONIUM NONOATE) AND SPECTRACIDE (DIQUAT DIBROMIDE) ON BROWN PLANARIA (GIRARDIA TIGRINA)

7.Sarah Weynand, Department of English, Tony Kapolka, Department of Mathematics and Computer Science, Wilkes University, Wilkes-Barre, PA 18766

PREPARATION AND EXPLORATION OF A JESUS NOVEL DATA SET

8.Will Torres and Dr. Carl Giuffre; Department of Mathematics and Computer Science at Adelphi University, Garden City, New York, 11542

A SIMPLE AGENT-BASED MODEL OF THE EUROPEAN HONEY BEE OVERWINTERING PROCESS

Molecular Biology- Microbiology

1.Brandon Thrope, Dept. of Chemistry, Manhattan College, 4513 Manhattan College Parkway, Riverdale, NY 10471

IDENTIFICATION OF RIBOSOMAL PROTEINS INTERACTING WITH CHROMATIN IN GENETICALLY MODIFIED YEAST CELLS.

2.Christopher Annabi, Biology Department, Iona College, 715 North Avenue, New Rochelle, NY 10801

BacM ISOFORMS ARE GENERATED THROUGH ALTERNATIVE START SITE SELECTION

3.Kate Arildsen, Faculty Mentor: Dr. Vijaykumar Veerappan Department of Biology, Eastern Connecticut State University, 83 Windham St, Willimantic, CT 06226

CHARACTERIZATION OF DEREGULATED ANTHOCYANIN PIGMENTATION (DAP) MUTANT IN THE MODEL LEGUME PLANT MEDICAGO TRUNCATULA

4.Khaitlyn Figueroa, Dr. Sarah Wacker, Chemistry and Biochemistry Dept., Manhattan College 4513 Manhattan College Pkwy 10471

The Mechanism of Activation of Biofilm Formation

5.Ryan J. Torres, Chemistry & Biochemistry, 4513 Manhattan College Pkwy, The Bronx, NY 10471.

GENOTYPE-PHENOTYPE CHARACTERIZATION OF BIOFILMS PRODUCED BY BACILLUS SUBTILIS WILD ISOLATES

6.Sean P. Carrigan, Virginia E. Glazier PhD, Niagara University.

REPURPOSED DRUGS WITH ANTIFUNGAL ACTIVITY AGAINST Cryptococcus neoformans HAVE ADDITIONAL EFFECTS ON CAPSULE FORMATION

7.Velu Krishnan, Institute of NeuroImmuno Pharmacology and Department of Biological Sciences, Seton Hall University (South Orange, NJ, 07079)

NETWORK META-ANALYSIS ON NICOTINE'S MODULATION ON HIV-ASSOCIATED DEMENTIA

8. Letícia Guibunda, Biology Department, Ithaca College - 953 Danby Road Ithaca, New York 14850.

TARDIGRADE TOUGH TIMES: A GLOBAL COLLECTION ANALYSIS

Poster Groupings

The poster groupings are artificial for the current posting

Judges will be given specific posters to judge based upon a judge's expertise and interest.

Biochemistry and Chemistry

Avery Belenos, Nataliya Myshakina PhD, Science Department, Chatham University, 1 Woodland Rd Pittsburgh PA 15232

COMPUTING AFFINITY BETWEEN ESTROGEN RECEPTORS AND MODIFIED OXYBENZONE

Alexandrea Papadelias, Emer-Rico E. Mojica PhD, Department of Chemistry and Physical Sciences, Pace University, One Pace Plaza, New York, NY 10038

FATTY ACID PROFILE OF HUMAN MILK SAMPLES FROM THE PHILIPPINES

Baylee Caudill, Pace University. Elmer-Rico E. Mojica, Pace University Department of Chemistry and Physical Sciences.

SPECTROSCOPIC DIFFERENTIATION OF BEE PROPOLIS EXTRACTS

Dylan Cho and Alex Pinto, Department of Chemistry and Biochemistry, Manhattan College, Riverdale, NY, United States

HYDROTHERMAL PREPERATION OF TITANIUM DIOXIDE (TiO2) FROM PRECURSORS SYNTHESIZED BY THE OXIDANT PEROXO METHOD (OPM)

Jennifer Hutnik, Chemistry Department, Pace University 1 Pace Plaza New York, NY 10038

ANTIOXIDANT ACTIVITY OF BEE PROPOLIS EXTRACTS FROM THE UNITED STATES

Christian Machado, Yelda Balkir, Department of Chemistry and Biochemistry, Manhattan College (Riverdale, NY, 10471)

SYNTHESIS OF BIOFUELS FROM WASTE MATERIALS

Lawrence Phillips, Chemistry, Pace University, One Pace Plaza, New York, NY, 10038

CHROMATOGRAPHIC ANALYSIS OF BEE PROPOLIS FROM DISTINCT SECTIONS OF THE UNITED STATES OF AMERICA

ECOLOGY

Aidan Lawrence Murphy, Patrick O'Donnell, and Latina Steele department of biology at Sacred Heart University 5252 Park Ave Fairfield CT 06825

EFFECTS OF USING PHYTOPLANKTON OR ZOOPLANKTON AS A FOOD SOURCE FOR DUNCANOPSAMMIA AXIFUGA

Alexis Ayrey, Biology Department, Iona College 715 North Ave, New Rochelle, NY 10801

Invasional Meltdown: The dispersal of the non-native C. incisa in a non-native dominated ecosystem

Elizabeth Kelsey - Gossard, Dr. William Edwards, Dr. Cassandra Marnocha, Professor Coleen Edwards, Biology Department, Niagara University, Niagara University, New York, 14109

ZOOPLANKTON GUT ANALYSIS USING MICROBIAL 16S RRNA GENE SEQUENCING

Noah Kaczmarek, Niagara University Biology Department. 5795 Lewiston Rd, Niagara University, NY 14109

ZOOPLANKTON RELATIVE ABUNDANCE: FAYETTEVILLE GREEN LAKE

Tiana Giovatto and Dr. LaTina Steele Sacred Heart University, Department of Biology, Fairfield, CT 0682

PATTERNS OF GRAZING AND PHENOLIC CONTENT WITHIN RESTORED AND NATURAL SPARTINA ALTERNIFLORA MARSHES

Sarah Weiby, Niagara University, 5795 Lewiston Rd, Niagara University, 14109 Cassandra Marnocha, PhD., William Edwards, PhD. Biology Department, Niagara University

ISOLATION AND CHARACTERIZATION OF SYNECHOCOCCUS FROM FAYETTEVILLE GREEN LAKE

Sarah Weiby, Mark Gallo, PhD. Niagara University, Lewiston, NY.

Long Term Effects of Plasmid Stability in E. coli in a Non-Selective Environment.

Thomas DeVantier, Mark Gallo, Biology, 5795 Lewiston Rd, Niagara University, NY 14109

NON-MIGRATORY HONEY BEE (APIS.MELLIFERA) COLONIES PERISH DURING WINTER DUE TO POSSIBLE PATHOGENS TRANSMITTED BY VARROA DESTRUCTOR

Mikayla Henry, Biology Department, Ithaca College, 953 Danby Road Ithaca, NY 14850

DOES PROXIMITY TO CULTIVATED HIVES IMPACT GENETIC DIVERSITY IN SCAEVOLA PLUMIERI?

Environmental Science

DeCoff, Brendan; Stablewski, Jacob; Marnocha, Cassandra Niagara University, 5795 Lewiston Rd, Niagara University, NY 14109

ISOLATION AND CHARACTERIZATION OF ACIDITHIOBACILLUS FROM THE IROQUOIS NATIONAL WILDLIFE REFUGE

Christopher Gonzales(Student),Dr. Christina Andruk(Mentor),Dr. Mychel Varner (Helper) , Biology Department, Iona College, 715 North Ave, New Rochelle, NY 10801

THE EFFECT OF BIOCHAR ON CARBON DIOXIDE PRODUCTION IN VERMICOMPOSTING AND NORMAL COMPOSTING

David Albro,Biology, St. Francis College 180 Remsen St #4305, Brooklyn, NY 11201

COMPARISON OF TWO NYC WATER QUALITY DATABASES OBTAINED THROUGH THE GOVERNMENT AND A CITIZEN SCIENCE GROUP

Joshlyn Mensah, Department: Biology and Health Sciences Department, Institution: St. Francis College, Institution Address: 180 Remsen St. Brooklyn, NY 11201

THE RELATIONSHIP BETWEEN FISH CONSUMPTION AND HUMAN HEALTH

Molecular Biology/Microbiology

Cassidy Baldauf, Dr. Nicole Roy, Biology Department, Sacred Heart University, 5151 Park Avenue Fairfield CT 06825

DI-BUTYL PHTHALATE (DBP) INDUCES DEFECTS IN EYE DEVELOPMENT IN ZEBRAFISH

Eleanora Robinson, Natural Science Department at Mount Saint Mary College, Newburgh, NY 12550

EVOLUTIONARY ANALYSIS OF DROSOPHILA ANANASSAE TTLL4A AND WUN2 PSEUDOGENES

Erica Eack, Natural Science Division, Mount Saint Mary College, 330 Powell Avenue Newburgh, NY, 12550

ANNOTATION OF A NOVEL MICROBACTERIUM FOLIORUM PHAGE PARLEG

Joseph Annabi, Jack Dunican, and David Zuckerman, Biology, Iona College, 715 North Avenue, New Rochelle, New York, 10801

EXAMINING MULTIPLE PROTEIN ISOFORMS IN BACTOFILINS OF M. XANTHUS AND C. CRESCENTUS

Kassandra Cortes, Biology and Health Sciences Department, St. Francis College, 180 Remsen St. Brooklyn NY 11201

ARE GENETIC DIFFERENCES IN VARIOUS ETHNICITIES CORRELATED WITH SURVIVAL RATE IN BREAST CANCER?

Ryan Kim, Institute of NeuroImmune Pharmacology and Department of Biological Sciences, Seton Hall University (South Orange, NJ, 07079)

NETWORK META-ANALYSIS ON THE MECHANISMS UNDERLYING INFLAMMATORY DISEASES AND EXPOSURE TO ALCOHOL ACTIVATION OF NEUROINFLAMMATION SIGNALING PATHWAY

Katherine Lee, Biology, Iona College, 715 North Avenue, New Rochelle, NY 10801

INVESTIGATING THE CONTRIBUTIONS OF BACM ISOFORMS TO MYXOCOCCUS XANTHUS CELL SHAPE AND ANTIBIOTIC RESISTANCE

José A. Gómez Leuridan & Dr. Cassandra Marnocha, Environmental Science, Niagara University, 5795 Lewiston Rd, Niagara University, NY 14109

THE EFFECT OF PARK VISITORS ON MICROBIAL COMMUNITIES

Jesse Kozub (Niagara University, Chemistry, 5795 Lewiston Rd, Niagara University, NY 14109), Pavel Kovtunov (Niagara University, 5795 Lewiston Rd, Niagara University, NY 14109), Brandon Bruno (Niagara University, 5795 Lewiston Rd, Niagara University, NY 14109), David Vorobey (Niagara University, 5795 Lewiston Rd, Niagara University, NY 14109), and Dr. Mark Gallo PhD (Niagara University, Biology, 5795 Lewiston Rd, Niagara University, NY 14109)

CLONING GLYCOSIDE HYDROLASES

Ian O'Neill/ Maki Inada/ Rory Cohan, Biology Department, Ithaca College, 953 Danby Road, Ithaca, NY 14850

IDENTIFYING NOVEL SPLICE FACTORS: DEPLETION OF MTDNA FROM WHOLE GENOME SEQUENCING SAMPLES IN YEAST

Christopher Clark, Manpreet Singh, Dr. Mark Gallo PhD, Biology, Niagara University, 5795 Lewiston Rd, Niagara University, NY 14109

THE CHARACTERIZATION AND DETAILED BIOINFORMATIC STUDY OF NOVEL STAPHYLOCOCCUS BACTERIOPHAGE

Catrina Sullivan Department of Biology, Eastern Connecticut Statement University, 83 Windham St, Willimantic, CT, 06033

CHARACTERIZATION OF MEDICAGO TRUNCATULA PLANT MUTANTS WITH DEFECTIVE SYMBIOTIC NITROGEN FIXATION AND SUPERNODULATION PHENOTYPES

Psychology

Christina Chodkowski. Derner School of Psychology, Adelphi University. 1 South Ave, Garden City, NY 11530

GENDER ROLES AND SELF-ESTEEM

Jada Rojas, Itati Abadie, Samantha Healy, Michelle Pei. Psychology Department, Ithaca College 953 Danby Rd Ithaca, NY 14850

FIRST GENERATION STUDENTS AND ACADEMIC ANXIETY

Kasey Charron, Brianne Cooley, Jessica Mobbs, Bleue Silkensen, & Parise Ricks, Psychology Department, Ithaca College, Ithaca, NY, 14850

CHANGES IN DEPRESSION, ANXIETY, STRESS, SOCIAL SUPPORT, SUBSTANCE ABUSE, SOCIAL MEDIA USE, AND EATING DISORDERS DURING THE 2020 COVID-19 PANDEMIC

Katherine Peake and Robert Fogle, Department - Neuroscience Program, John Carroll University, 1 John Carroll Blvd., University Heights, OH 44118

THE EFFECTS OF CACAO ON SPATIAL WORKING MEMORY IN RATS

Nora Foster, John Egan, Cade Ferreras, Psychology Department, Ithaca College, Ithaca, New York, 14850

MINDFULNESS, EMPATHY, AND ROMANTIC BELIEFS

Riley Justice and Jamie Gatesman, Neuroscience Program, John Carroll University, 1 John Carroll Blvd., University Heights, OH 44118

THE IMPACT OF CHRONIC PSYCHOLOGICAL TRAUMA ON MEMORY AND SOCIALIZATION IN RATS

James Bonanno (Yale University, New Haven, CT, 06510; Vassar College, Poughkeepsie, NY, 12604), Jenny Lin (Vassar College, Poughkeepsie, NY, 12604), Julia D'Orazio (Vassar College, Poughkeepsie, NY, 12604), Kayen Tang(Pi) Lori Newman (Vassar College, Poughkeepsie, NY, 12604)

INVESTIGATING THE ROLE OF PREFRONTAL CORTEX ASTROCYTES IN SPATIAL WORKING MEMORY

Jason DeBoard, Rose Dietrich, Angela Croop, James Hughes, James Oschal Wilkes University.

CHARACTERIZATION AND CORRELATION OF NEURODEGENERATION AND BIOLOGICAL MARKERS OF MODEL MICE WITH TRAUMATIC BRAIN INJURY AND ALZHEIMER'S DISEASE

Mathematics

Areeba Khalid, Mathematics & Computer Science, Adelphi University, 1 South Ave, Garden City NY, 11530. Nara Yoon, PhD, Mathematics & Computer Science, Adelphi University, 1 South Ave, Garden City NY, 11530

AN ADVANCED SIMULATION MODEL TO PREDICT THE IMPACT OF COLLATERALLY SENSITIVE DRUG CYCLES FOR CANCER THERAPY

Physics

Cordell Siggins, Thomas Smith, Matthew Costello, Physics, Wilkes University, Wilkes-Barre Pennsylvania, 18766

PREDICTING PROTEIN-DRUG AFFINITY WITH TOPOLOGICAL DATA ANALYSIS AND DEEP LEARNING

Joshua R. Hughes, Neuroscience Program, John Carroll University, 1 John Carroll Blvd., University Heights, OH 44118

HIGH THROUGHPUT CARBON NANOTUBE FIELD EFFECT TRANSISTOR ASSEMBLY FOR RAPID SENSOR DEVELOPMENT

Spencer Yacuboski, Electrical Engineering and Physics, WIlkes University, Wilkes-Barre, PA, 18702

THE FLUOROUS EFFECT

Physiology

Karlee Schultz, Haley Kovach Department: Neuroscience Program Institution: John Carroll University, 1 John Carroll Blvd., University Heights, OH 44118

CLOCKS AND CAFFEINE: HOW TIME OF DAY IMPACTS ANXIETY IN LONG EVANS RATS

Melis Akman, Department of Biology, Sacred Heart University, Fairfield CT 06285; Nicholas Ayala, Department of Biology, Sacred Heart University, Fairfield CT 06285

METABOLIC EFFICIENCY AND MECHANICS OF WALKING ON SLOPED TERRAIN

Erum Ajmal, Chemistry, Adelphi University. 1 South Avenue, Garden City, NY, 11530.

Synthesis of phenyl pyridines, pyridazines and pyrimidines to test for their inhibition on the enzyme Uridine Nucleoside Ribohydrolase (UNH).

Trichomoniasis, a common sexually transmitted disease is caused by a parasite Trichomonas vaginalis. In order for this parasitic protozoan to reproduce, it has to obtain specific nucleobases from its host. For this reason, a potential inhibition for this parasite would be the inhibition of enzymes that produce such nucleobases, such as uridine nucleoside ribohydrolase (UNH). A preliminary result had shown that a compound, 3-(3-methylpyridin-2-yl) benzonitrile, showed significant inhibition of UNH, with an IC_{50} value of 14 μM. Derivatives similar to this molecule were made using Suzuki cross-coupling reaction. A phenylboronic acid was reacted with an aryl bromide and palladium as catalyst to synthesize phenyl pyridines, pyridazines, pyrazines and pyrimidines. Synthetic results using Suzuki reactions and biological data of the derived compounds obtained against UNH will be discussed.

Christopher Annabi, Biology Department, Iona College, 715 North Avenue, New Rochelle, NY 10801.

BacM ISOFORMS ARE GENERATED THROUGH ALTERNATIVE START SITE SELECTION

BacM is a bactofilin expressed by Myxococcus xanthus that contributes to the bacteria’s rod-shaped morphology. BacM has been observed as a large (BacM-L) and small isoform (BacM-S) that differ at their N-termini by ~27 amino acids. Two hypotheses regarding the generation of these isoforms were considered. One hypothesis suggests BacM-L is synthesized as a precursor protein that is cleaved by a protease at the sites of cytoskeleton elongation. An alternative hypothesis suggests that BacM-L and BacM-S are generated through

alternative start site selection by the ribosome. These hypotheses were tested by engineering a plasmid containing bacM with its 5’ untranslated sequence; point mutations were introduced using PCR-directed mutagenesis. Mutants were made to abolish the first start codon (M1L), abolish the putative second start codon (V24L), and introduce a frameshift between the first and second start codons (K8 frameshift). When observed by immunoblot, mutants M1L and K8 frameshift expressed only BacM-S, whereas mutant V24L expressed only BacM-L. Additional mutants were made to abolish a putative internal ribosome binding sequence using silent mutations (ΔRBS2), introduce a silent mutation to the internal start valine (V24V), mutate the valine start codon to a methionine (V24M), and mutate the valine start codon to a leucine start codon (V24L-UUG). When observed by immunoblot, mutants ΔRBS2 and V24V expressed only BacM-L, while mutants V24M and V24L-UUG expressed both isoforms. These results are consistent with the hypothesis that BacM-L and BacM-S are generated through alternative start site selection.

Kate Arildsen, Faculty Mentor: Dr. Vijaykumar Veerappan Department of Biology, Eastern Connecticut State University, 83 Windham St, Willimantic, CT 06226

CHARACTERIZATION OF DEREGULATED ANTHOCYANIN PIGMENTATION (DAP) MUTANT IN THE MODEL LEGUME PLANT MEDICAGO TRUNCATULA

Anthocyanins and proanthocyanins (PAs) are flavonoid compounds produced in various plant organs, such as leaves, fruit, and seeds. These compounds are involved in a number of important plant physiological functions. The pigments attract pollinators and lead to seed dispersal, as well as providing UV protection and acting as a feeding deterrent from herbivores. In addition to the benefits conferred to plants, anthocyanins and PAs have agricultural and pharmaceutical applications. To discover novel genes that regulate and control anthocyanin and PA accumulation in plants, we are using a forward genetics approach in the model legume plant Medicago truncatula. A large mutant population was created by inserting the tobacco retrotransposon Tnt1 into the R108 ecotype of M. truncatula by the Noble Research Institute. By screening approximately 4,000 mutants, several mutants were identified that were defective in anthocyanin and PA pigment production. One of the mutants deregulated anthocyanin pigmentation (dap) shows increased numbers of reddish anthocyanin spots on both adaxial and abaxial sides of the leaves compared to the wild-type, indicating the misexpression of anthocyanin pigmentation. dap is a novel mutant because mutants with similar phenotypes have not been reported. I will present data on the detailed phenotypic characterization,

quantification of anthocyanin pigments,Tnt1 insertion analysis and mRNA expression of selected flavonoid biosynthetic and known transcriptional factor genes.

Noah Bach, Sydney Scheck, & Jessica Wang. Psychology Department, Ithaca College, 953 Danby Rd, Ithaca, NY, 14850

BAD EDUCATION: A CONTENT ANALYSIS OF PORTRAYALS OF TEACHERS AND SCHOOL PERSONNEL ON TEEN SHOWS, SITCOMS, AND TV DRAMAS

Media messages are powerful influences on how we perceive and interact with the world around us. Schools often serve as the backdrop for popular teen shows, sitcoms, and TV dramas - but what do children learn about teachers and schools from watching television? Qualitative studies (Dalton & Linder, 2008; Mitchell & Weber, 1995; Swetnam, 1992) of the portrayal of teachers in TV shows and films have identified common stereotypes about teachers (e.g., nerdy, funny but ineffective, popular and perfect, grumpy burnout). However, there have been few quantitative content analyses of the portrayals of teachers and other school personnel (e.g., principals, counselors, coaches). This descriptive content analysis examined portrayals in nine different programs (teen shows, sitcoms, and TV dramas) covering three decades of television. Three episodes of each program were analyzed by trained pairs of coders to assess the characters' demographics, archetypes, relationships and interactions with students, and types of activities shown on-screen. Findings showed that teachers were seldom portrayed actually teaching content, grading, or preparing for class. Instead, they were often shown involved in their personal life and relationships, bantering with students, engaging in rivalries and conversations with other teachers, and dealing with students' problems. Students, teachers, and principals were often engaged in unprofessional dialogues and behaviors with each other. The demographic analysis showed that the majority of teachers portrayed were white males (although principals and students reflected more diversity), and except for school administrators, other personnel (e.g., librarians, nurses, custodians) were rarely shown.

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REPURPOSED DRUGS WITH ANTIFUNGAL ACTIVITY AGAINST Cryptococcus neoformans HAVE ADDITIONAL EFFECTS ON CAPSULE FORMATION

The fungus Cryptococcus neoformans has the capability to be pathogenic with life threatening effects to individuals with a compromised immune system. In resource limited countries, there is a greater need for affordable yet effective

drugs that treat C. neoformans infections because of the high rates of HIV/AIDS infections. Repurposing a drug that has already been approved by the FDA not only saves money as these drugs are off-patent, it also saves time trying to discover a new drug that would have to go through FDA regulations before it is safe for human use. Drugs such as thioridazine and trifluoperazine have been identified to have antifungal effects in previous studies, however their mechanisms of action are still unclear. We hypothesize that in addition to having an antifungal effect, these drugs may also influence the capsule formation of Cryptococcus neoformans as well as it's cell wall structure. We have found that both thioridazine and trifluoperazine appear to influence capsule formation, a key component in Cryptococcus neoformans pathogenesis. Additional tests on cell wall integrity and cell wall integrity signaling pathways suggest that these drugs may impact capsule formation in a manner that is independent of the cell wall structure.

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REGENERATION OF CHAPARRAL SPECIES AFTER FIRES

Fires are a frequent occurrence for chaparral plants of coastal California. Historically, fires occurred before human interference, but they have become more frequent with human presence. Several chaparral species require fire for seed germination. Additionally, many chaparral species regenerate foliage from axillary and adventitious buds near ground level after fires. These two strategies allow chaparral species to be dominant in fire-dominated coastal California regions. Chaparral species are also very resistant to summer drought, making them well adapted to coastal California. The above characteristics allow chaparral species to compete effectively in coastal regions. Chaparral species have strong regeneration capacities after fires. The anatomical characteristics of adventitious buds of four chaparral species were studied. Plants of Ceanothus leucodermis and Adenostoma fasciulatum many visible adventitious buds while Quercus dumosa and manzanita (Arctostaphylos sp.) did not have visible buds near ground level on stems. Anatomically, the buds of the four species had very distinctive buds. Buds of C. leucodermis and A. fasciulatum were well developed with apical meristems with extensive vascular tissues. Buds of Q. dumosa were less developed and while buds of manzanita were deeply embedded within stems. Buds of manzanita had the least developed vascular tissues of the four species. Buds of the four species had very different characteristics. However, the buds are well suited for emergence after fires.

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SNAKE HABITATS VS. GLAMOUR TIPS: A CONTENT ANALYSIS OF GENDERED MESSAGES IN CHILDREN'S ACTIVITY BOOKS

Previous studies have analyzed gender messages in children's television programs, commercials, and literature, noting that girls and women are often underrepresented and portrayed in stereotypical ways (Berry et al., 2017; Hamilton et al., 2006; Matthes et al., 2016). However, there has been little research on gendered messages in activity books aimed at children and young teens, despite their popularity. Using the activity as the unit of analysis, a total of 843 activities were coded from five books (e.g., crosswords, word searches, sudoku, image matching, tips). Each activity was examined by a pair of trained coders analyzing target audience (boy, girl, neutral), text and visual content (e.g., activity instructions, themes, colors, animals), and characters (including their gender, race, age and body type). Findings showed that books geared towards girls were far more likely to include messages regarding physical appearance and relationships, with a lighter color scheme (especially pink). Books geared towards boys were much more likely to include content related to sports, cars, and creatures like bugs, snakes, and spiders. Content in the one gender-neutral book aligned more with that of the books geared towards boys. Additionally, the vast majority of characters portrayed in all books were white and primarily featured characters of the gender that matched the target audience.

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CHARACTERIZATION OF BACILLUS SUBTILIS BIOFILMS USING FLUORESCENCE SPECTROSCOPY

Many bacteria form complex multicellular communities known as biofilms. Biofilms are a common source of human infections and are specifically associated with chronic infections and with infections resulting from biomedical implants. Biofilm-derived infections are particularly difficult to treat since the structure of biofilms provides bacteria with resistance to diverse environmental stresses, antimicrobial agents, and host immune systems. Despite the

importance and ubiquity of biofilms, most microbial investigations focus on cultures of free-living bacterial cells. Thus, the precise mechanisms that regulate biofilm assembly remain largely unknown. This research uses the bacterial model organism Bacillus subtilis to characterize the molecular basis of biofilm formation. One potential strategy for characterizing these biofilms relies on fluorescence spectroscopy of the molecules within biofilms. As bacterial biofilms are complex and dynamic ecosystems, we hypothesize that the biofilms generated by different strains of B. subtilis, or by a single strain of B. subtilis under varying media conditions, will have different fluorescence profiles due to their makeup of fluorescent molecules. To test this hypothesis we conduct fluorescence spectroscopy to measure profiles of B. subtilis biofilms and compare them with the fluorescence profiles of known biological molecules.

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The Mechanism of Activation of Biofilm Formation

Bacillus subtilis is a non-virulent, soil-dwelling bacterium that can form biofilms through a symbiotic relationship with plant roots. B. subtilis biofilms grow over roots, providing a barrier to protect the plant from exogenous factors such as pathogens, as well as triggering plant defense systems. While some plant molecules, including polysaccharides, are known to stimulate formation of biofilms, the complete mechanism by which biofilms are activated is unclear. We predict that there are common chemical signals from the metabolism of plants that stimulate B. subtilis biofilm formation. We tested a variety of plant samples to see if they stimulate biofilm formation and fractionated the samples to characterize the stimulating molecules. Pyruvate is a pivotal metabolite in all living cells. B. subtilis is able to excrete pyruvate as well as to use it as the sole carbon source and one of the signaling proteins of B. subtilis biofilms can bind pyruvate. Thus, we also tested whether pyruvate is involved in biofilm formation. Our observations indicate that a variety of plant parts promote biofilm formation. This finding suggests that the symbiotic relationship between plants and B. subtilis is a result of the recognition of general molecules, such as those involved in metabolism, by B. subtilis. Our attempt to categorize the stimulatory molecules shows that large hydrophilic molecules stimulate the biofilm pathway best. Future work includes further characterization of these molecules.

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Bending Stresses of Primary and Secondary Branches of Trees

The purpose of tree branches is to produce leaves for photosynthesis. Primary tree branches attached to main stems produce secondary branches in turn to spread laterally to accept as much sunlight as possible. The overall purpose of this study was to determine if the mechanical properties of secondary branches were similar to those of primary branches. The main stress for tree branches is bending stress which results from the weight of the branch by gravity. The hypothesis of this study was that bending stresses of are similar to primary and secondary branches. Branches of twenty tree species were collected around Manhattan College campus. The lengths of primary branches varied from 0.58 to 3.4 m with a mean of 1.8 m. The lengths of secondary branches varied from 0.29 to 1.36 m with a mean of 0.80 m. For the twenty species, primary branch stress ranged from 2.2 to 7.7 with an average of 4.26 MPa. For example, for Acer saccharum, Cercis canadensis, Plantanus occidentalis, Prunus serrulata, and Quercus mongolica with primary bending stresses were 6.8, 3.1, 2.2, 3.1, and 3.7 MPa, respectively. The bending stresses of the twenty primary branches and seventy-seven secondary branches were 4.26 and 4.20 MPa, respectively. A t-test shows probability for these data were between 0.20 and 0.40 indicating that the bending stresses of primary and secondary branches were similar. Overall, these data indicate that bending stresses were similar for the trees of our study.

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TARDIGRADE TOUGH TIMES: A GLOBAL COLLECTION ANALYSIS

The Tardigrade Tough (TT) global collection project began in the summer of 2020 as an option for continued student research in the midst of the pandemic. Participants were able to conduct research from various locations, allowing this project to reach a global scale. Tardigrades which are also known as water bears or moss piglets are microscopic extremotolerant organisms. Their ability to withstand diverse conditions/environments all over the world made them an ideal organism to collect and study in a remote home laboratory setting. During the summer the project began with 12 participants collecting moss and lichen samples, and as the project continued more collectors joined the effort, gathering samples from Brasil, Canada, Germany, and the United States. Over 600 samples were collected, labeled, photographed, and then stored in a cool

and dry place until they could be brought back to Ithaca College for further study. 320 (51%) of these samples were rehydrated to be screened for tardigrades and other organisms. We used 18s PCR followed by Sanger Sequencing on 31 tardigrade samples and a Hypsibius exemplaris control. The sequencing results allowed for phylogenies to be constructed that revealed some unexpected results, such as various tardigrades that originated from the same sample belonging to relatively far-related species. As more samples are screened and sequenced we hope to learn more about the global distribution of tardigrade species and identify a new lab appropriate species.

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UNDERSTANDING INTERACTIONS BETWEEN HISTONE DNA AND RPLS IN S. CEREVISIAE

Mass spectrometry (MS) is an analytical technique that can be used for the identification of unknown proteins, based on peptide mass predications. Our lab utilizes a protein-protein crosslinking system, in vivo, that allows us to covalently trap interacting prey proteins with a selective bait target. Isolation of these bait-prey complexes are then subjected to MS analysis for identification of prey proteins that efficiently crosslink to the target. We use histone proteins as our bait because we are interested in understanding the nucleosomal interactome and identifying proteins that influence chromatin dynamics. Using the unnatural amino acid p-benzoylphenylalanine, which captures protein-protein interactions upon UV-irradiation, we encode the crosslinking probe, site-specifically into our bait. This provides high spatial resolution of identified binding partners. Interestingly, this technique identifies ribosomal proteins crosslinking to histone proteins at the nucleosomal surface. This is unusual, considering that ribosomes and chromosomes are separated by the nuclear membrane. We find convincing levels of ribosomal large proteins, RL1A, RPL3, RL5A, RL8A, RPL10, and RL15B bound to the histone H2A acidic patch. Here, we genetically tag the identified ribosomal proteins in an attempt to biochemically prove their presence in the nucleus and characterize their histone binding functionality.

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THE EFFECTS OF ORTHO GROUND CLEAR (AMMONIUM NONOATE) AND SPECTRACIDE (DIQUAT DIBROMIDE) ON BROWN PLANARIA (GIRARDIA TIGRINA)

Little is known about the ecological toxicity of many herbicides used to control household weeds. This project focused on two such herbicides- Ortho Ground Clear (Ammonium Nonoate) [GC] and Spectracide (Diquat Dibromide) [Spect]. The purpose of the study was to determine the toxicity of these herbicides on the light escape behavior and head regeneration in brown planaria . In Phase l of the study, the lethal concentration for each herbicide was determined for whole intact flatworms. Spect (10-3) caused 100% lethality after one day (n=3). GC (10-3) and GC (10-5) did not cause death; however, escape behavior of intact worms was slower than the controls. In Phase ll, six decapitated planaria were exposed to GC or Spect to determine the effects on the progress of head regeneration. In controls (Poland spring water), regeneration of the head and eyes was complete in about 1 week. A sub-lethal dose of Spect (10-4) slowed down head regeneration, but GC concentrations of 10-4 and 2.5 X 10-4 had little effect on regeneration. There appeared to be a direct relationship between Spect concentration and prevalence of delays during the head regeneration process. In Phase III, six decapitated planaria were exposed to Spect to determine their effect on light escape behavior. In control (Poland spring water), the flatworms escape a beam of light in about 15-20 seconds. Flatworms exposed to Spect (10-4) took a significantly longer period of time (about 3 X longer) ($p<0.001$) than controls or those in 10-5 or 10-6 Spect.

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THE ROLES OF TYROSINE KINASES IN BACTERIAL BIOFILMS

Bacterial cells often organize themselves into complex multicellular communities that carry out specialized tasks. These communities, which involve the collective behavior of different cell types, are frequently referred to as biofilms. Cells in a biofilm are encapsulated in a matrix of material that holds them together. Biofilms are of immense importance to public health because of their role in certain infectious diseases and their ability to share nutrients and stay sheltered from harmful factors in the environment, such as antibiotics, and a host body's immune system. This research study will closely look at a bacteria known as

Bacillus subtilis, which will be used to understand the role of tyrosine kinases in the regulation of bacterial biofilms. Prior research has concluded that the proteins EpsA and EpsB are both integral in biofilm formation as EpsA modulates EpsB while EpsB phosphorylates other proteins. These two proteins are required for robust production of EPS, a polysaccharide in the biofilm matrix. This research study will explore the roles of a second tyrosine kinase in B. subtilis, PtkA, and its cognate modulator TkmA. We hypothesize that PtkA has a role in biofilm formation, similar to the role of EpsB. We tested the role of PtkA by creating deletion and phosphomimetic mutants of PtkA and testing their biofilm phenotypes. An understanding of tyrosine kinases and the regulatory pathways that assist in biofilm formation can inform how bacteria come together to cause disease, potentially curtailing the infection cycle of various bacterial pathogens.

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QUANTIFYING THE CYTOTOXICITY OF TOXINS AND PROTEIN MISFOLDED OLIGOMERS AS A FUNCTION OF CELL MEMBRANE COMPOSITION

Alzheimer’s disease (AD), a progressive, currently incurable neurodegenerative disorder that affects nearly 50 million people around the world, is hallmarked by the aggregation of the 42-residue form of the amyloid-β protein (Aβ42). Transient oligomeric species are formed during the Aβ42 deposition process, and these aggregates are highly cytotoxic and thought to play an important role in the onset and development of AD. Previous research suggests that these oligomers cause cell death by interacting with the cellular membrane, therein disrupting membrane integrity and ion homeostasis. We therefore surmised that altering the composition of the cellular membrane would affect the extent of the interactions between protein misfolded oligomers and the cell. Through a variety of tissue culture experiments using SH-SY5Y cultured neuroblastoma cells, we altered the membrane composition of the neurons by incubating them with varying concentrations of key membrane lipid components, such as gangliosides, ceramide, sphingomyelin, docosahexaenoic acid and eicosapentaneoic acid, and measured the resilience of these altered cells to Aβ42 oligomers and melittin, the latter of which is a model of acute cellular toxicity which we chose for its similarity in mechanism to Aβ42 oligomers. We found that these membrane lipids affected the resilience of the cells to these toxins in differing ways, either by increasing, decreasing, or non-linearly changing their health as a function of lipidic enrichment. These findings demonstrate the importance of membrane composition in mediating the resistivity of cells to toxic biomolecules.

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NETWORK META-ANALYSIS ON NICOTINE'S MODULATION ON HIV-ASSOCIATED DEMENTIA

HIV-Associated Dementia (HAD) is a significant comorbidity that many HIV-patients face. Our study utilized the Ingenuity Pathway Analysis license from QIAGEN to identify/analyze the pathways underlying nicotine’s neuroprotection on HAD pathology. The Qiagen Knowledge Base (QKB) defines HAD as “Dementia associated with acquired immunodeficiency syndrome (disorder).” Although much remains unknown about HAD pathology, previous research from the QKB shows that upregulated molecules associated with exacerbating HAD include CCL2, L-glutamic acid, GLS, POLG, and POLB. The initial findings focused on molecules associated with HAD. So the Pathway Explorer tool was used to connect nicotine with GLS, POLG, and POLB by intermediary molecules since they previously lacked direct connections to nicotine. The Molecule-Activity-Predictor (MAP) tool showed limited evidence for nicotine’s neuroprotective effects since only the GLS and L-glutamic acid pathways were downregulated. Thus, to view the network more holistically and simulate how molecules in the human body interact with each other, the 35 molecules in the pathway were all connected to each other using the Connect tool. It was then found that each of these 35 molecules (includes transcription regulators, cytokines, kinases, and other enzymes/proteins) in the pathway could be individually inhibited using the MAP tool while simultaneously activating nicotine in order to realize nicotine’s neuroprotective effects at varying degrees according to the downregulation of the 5 specific HAD pathology pathways. These findings confirm nicotine’s therapeutic properties for HAD when given alongside specific inhibitory drugs for one or many of these 35 molecules. Research partially supported by R01DA0462582.

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PURIFICATION AND CHARACTERIZATION OF THE PROTEIN KIND THAT IS INVOLVED IN BACILLUS SUBTILIS BIOFILM FORMATION

Purification and Characterization of the Protein KinD that is involved in Bacillus subtilis Biofilm Formation Rachel Mojica Other authors: Upasana Chowdhury, Juan Lara-Garcia, Sarah Wacker Department of Chemistry and Biochemistry Manhattan College Abstract. Biofilms are important structures in agriculture, bacterial infections, and environmental settings. They are communities of bacteria that grow attached to a surface and encapsulated in a self-made matrix. The bacteria Bacillus subtilis form biofilms that are regulated through a

biochemical pathway that begins with four kinases: KinA, KinB, KinC, and KinD, and results in the increased transcription of two main operons: epsA-O and tapA-sipW-tasA, that produce the components of the biofilm matrix. It has been demonstrated that KinA and KinB regulate entry into sporulation while KinC and KinD contribute to biofilm formation itself. Understanding the biofilm pathway in detail could have a huge, positive impact on Agronomy. To better understand the biofilm pathway of B. subtilis, a biochemical characterization of the kinase, KinD, was conducted. KinD is an integral membrane protein with an extracellular sensor domain and an intracellular histidine kinase domain. We hypothesize that KinD is an important protein for binding small molecules and interacting with other proteins in the biofilm pathway. To purify KinD, separate His-tagged constructs of the extracellular and intracellular domains were created. After purification with Nickel resin, the protein constructs were characterized using a gel filtration column. The protein yield has been found to be low and the protein appears to have multiple oligomeric states. The purification protocols will be revised and improved to generate higher yields of KinD protein that can be used in binding studies with other biofilm proteins.

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SYNTHESIS OF PHENYL PYRAZOLES FOR THE INHIBITION OF UNH IN TRICHOMONAS VAGINALIS

Trichomoniasis, one of the most common sexually transmitted diseases in the world, is caused by the parasitic protozoan Trichomonas vaginalis. Current treatments use 5-nitroimidazoles to damage DNA residues, but due to increasing resistance over time, there has been a need to find new methods. Another potential is by inhibiting the function of the parasite’s nucleoside ribohydrolases, specifically the UNH, which is important for metabolizing uridine from host cells. Compounds from a fragment collection were tested for inhibition of UNH. Out of the many fragments, a phenyl pyrazole, 4-(1-methylpyrazol-4-yl)benzamide, was seen to have caused moderate inhibition. To increase inhibition at lower concentrations, compounds were synthesized with a change to the position and/or type of functional group on the phenyl ring of the aforementioned fragment by way of a Suzuki reaction. This reaction was done by combining

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INVESTIGATING THE DEPENDENCE OF BIOFILM PHENOTYPES ON SPECIFIC GENES

Biofilms are complex communities of microorganisms that attach to surfaces and produce an extracellular matrix that cannot be penetrated by many antibiotics. The bacterial strain Bacillus subtilis is a model organism for studying biofilm formation. Our goal is to find genetic variations in the genes responsible for biofilm formation to see whether this is the cause of the variation in phenotypes seen among various wild isolates of B.subtilis. We focused on two strains in particular, Bs12 and Bs20, because of a genetic variation found in their SinI gene. As SinI is an important biofilm formation protein, we hypothesize that these genetic variations are responsible for the altered phenotype seen in the wild isolates. First a deletion mutation of the sinI gene was generated to determine whether a biofilm can form without SinI; as expected, a SinI mutant was unable to form a biofilm. To test the genetic variations found in SinI we cloned a plasmid containing the Bs12 and Bs20 genes for SinI. This plasmid was transformed into the lab strain, 3610, to see if there is any variation among biofilm phenotypes. This project provides insight into how natural variation arises among wild isolates to create differing biofilm phenotypes.

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ATTENUATION OF CYTOTOXITY CAUSED BY PROTIEIN MISFOLDED OLIGOMERS USING SMALL MOLECULE COUNTERMEASURES

Alzheimer’s disease (AD) is a presently incurable neurodegenerative disorder characterized by progressive memory loss and cognitive impairment. Highly transient and heterogenous oligomeric aggregates of the 42-residue form of the amyloid-β protein (Aβ42) play a central role in the onset and progression of AD. We postulated that the cytotoxic effects of Aβ42 oligomers to neuronal cells could be mitigated using small molecule countermeasures by targeting either their rate of formation or their ability to bind cell membranes. We leveraged a variety of tissue culture measurements to test the health of SH-SY5Y neuroblastoma cells after their exposure to oligomers of Aβ42 and varying concentrations of potential small molecule countermeasures, including vitamins and natural products. We found that Vitamins A and E and epigallocatechin gallate (EGCG) alleviated the toxicity of Aβ42 oligomers to cells through unique mechanisms, where the vitamins improved cell health through the aspecific enhancement of cell viability and EGCG specifically targeted Aβ42 oligomers.

Chemical kinetics measurements demonstrated that EGCG disaggregates insoluble Aβ42 species, therein reducing the concentration of toxic oligomers in solution. These findings demonstrate a paradigm to investigate potential countermeasures against oligomeric species in AD.

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IDENTIFICATION OF RIBOSOMAL PROTEINS INTERACTING WITH CHROMATIN IN GENETICALLY MODIFIED YEAST CELLS.

Ribosomal proteins (RPs) are synthesized in the nucleolus of eukaryotic cells. Prior studies have shown that these small proteins interact with nucleosomes as a regulator of chromatin function. Utilizing a mass spectral (MS) in vivo crosslinking approach, we have identified several RPs from the large (60S) subunit, which make direct contacts with the nucleosome. The RP interactions occur at the histone H2A acidic patch, a well known docking site for numerous chromatin related proteins. Here, we aim to verify the histone-RP contacts we observed via MS using in vivo unnatural amino acid crosslinking and immunoprecipitation. Using an expanded genetic code in yeast we selectively encode a UV-inducible crosslinker, p-benzoylphenylalanine, into the histone H2A acidic patch, allowing the probe to distribute itself across the native chromatin landscape. The amino acid performs a cross-linking reaction via formation of a diradical, under UV light irradiation, forming covalently trapped protein-protein interactions. The histone has an HA-tag, a common peptide sequence used for detection, and the RPs have genetically encoded myc tags. We use immunoprecipitation to isolate the RP and then use western blotting to visualize the HA tag on the histone. We have identified several RPs that may bind to the nucleosome ,including RPL1A, RPL3, RPL8A, RPL10, and RPL15A. This research has already shown promising results that RPL3 forms a unique bond to the histone H2A acidic patch.

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A SIMPLE AGENT-BASED MODEL OF THE EUROPEAN HONEY BEE OVERWINTERING PROCESS

Temperature and environment directly impact the overwintering behavior of the European honey bee, Apis mellifera. Since A. mellifera species often live in temperate climate areas, they undergo physiological adaptive changes, forming a thermoregulating cluster around the queen bee. This cluster, known as the superorganism, changes its size based on air temperatures in the surrounding

environment. The cluster moves around the frame structure, consuming stored resources, providing food and shelter for the reproductive member of the colony. We demonstrate this clustering phenomenon as a simple game, written in Python, that incorporates temperature data from the National Oceanic and Atmospheric Administration (NOAA). The game, an agent-based model, simulates the overwintering process of the A. mellifera superorganism, and the expected survivorship of a simulated honey bee cluster.

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GENOTYPE-PHENOTYPE CHARACTERIZATION OF BIOFILMS PRODUCED BY BACILLUS SUBTILIS WILD ISOLATES

Biofilms are communities of microbes that live within a self-produced extracellular matrix and are important in various ecological and medical settings. Bacillus subtilis is a bacteria known to produce biofilms that protect some plants from pathogens. All strains of B. subtilis, however, are not equally able to protect plants or form biofilms. This research aims to understand the genetic basis for why some strains of B. subtilis form more robust biofilms than others. We examined the differences in biofilm structure of twenty wild isolates. This was done by characterizing each of their biofilms on several types of media. In concert, genomic DNA was sequenced from all twenty wild isolates. Also, the abundance of a particular protein was analyzed by dye-staining and fluorescence spectroscopy. Our findings indicate that most wild isolates produced a more robust biofilm than our laboratory strain. The intensity of biofilm produced was found to be media dependent. When analyzing the sequences of the strain of bacteria that are B.subtilis, several coding genetic variations were found in genes affiliated with the regulation of biofilm formation as well as structural genes. These variations lead to possible sites for further testing in relation to the biofilm structure produced.

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SYNTHESIS OF 2-(2-METHYLPYRIDIN-3-YL)PHENOL DERIVATIVES AS URIDINE NUCLEOSIDE RIBOHYDROLASE INHIBITORS

Trichomoniasis is a sexually transmitted disease that is caused by a parasite called Trichomonas vaginalis. The parasite does not create nucleobases and will obtain them from the host to reproduce. Uridine nucleoside ribohydrolase (UNH) is one of the salvage pathway enzymes used by the parasite to obtain nitrogenous bases. There are treatments for trichomoniasis but some strains of

the parasite are growing resistant and new treatments are needed. Using a different pathway, potential inhibitors can be used as treatment against the parasitic infection. 2-(2-Methylpyridin-3-yl)phenol (Figure 1) was found to inhibit UNH with an IC50 value of 1.9 μM. Using this scaffold, derivatives were made using the Suzuki reaction. Suzuki reaction is a cross-coupling reaction that combines a boronic acid and an aryl halide with a palladium catalyst, to create biaryl compounds. After the compound was made, they were tested against the parasite to obtain an IC50. The goal is to create a compound that can inhibit UNH at a sub micromolar IC50 value.

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INTERNAL SYMMETRIES IN MUSICAL 12-TONE ROWS

The twelve-tone technique is a method of music composition from the Serialist school of Western music. This technique ensures that all twelve notes of the Western chromatic scale are given equal precedence by establishing a fixed permutation or "row" of notes that determines the structure of the composition. This technique has helped Serialist composers to produce novel atonal pieces and has also generated interest among mathematicians for the rigid and repetitive structures it engenders. In 2003, Hunter and von Hippel used group theory to enumerate equivalence classes of 12-tone rows under a group of music-theoretic symmetries. They found that highly symmetric rows constitute just 0.13% of row classes, yet these rows arise in 10% of actual compositions. Focusing on the twelve-tone compositions of Schoenberg, Webern, and Berg, we show that well half of these compositions contain unusually high levels of symmetry. We first introduce a flexible standard for quantifying the incidence of short repetitions and symmetries in tone rows. This standard generalizes the notion of symmetry in the literature, uncovering many themes and motifs that were undetected in the analysis of Hunter and von Hippel. Using the theory of lattices and partially ordered sets, we then study the set of symmetry classes under several standard gradings. We find that the portion of highly symmetric compositions in each composer's corpus is stable under choice of grading, and that this portion ranges from 48% (Berg) to 95% (Webern). Lastly, we use statistical methods to confirm that the Serialist composers Schoenberg, Webern, and Berg displayed a significant preference for symmetry in their work.

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PREPARATION AND EXPLORATION OF A JESUS NOVEL DATA SET

Beginning with 75 pericopes of Jesus' baptism narrative, we scored each based on more than twenty-five dimensions to determine both their narrative form and the function. Form dimensions measured include basic readability metrics such as grade level, word length, and passage emotion/sentiment analysis. Narrative-specific forms calculated included Haswell's 'tactics' of understanding, knowing, and language and audience sense and Stanzel's narrative hextant. A pericope's function is assigned to one of four categories: mythologizing, traditional, demythologizing, and deconstructing. Data set prepared, machine learning techniques (decision trees, SVM, kNN, and a Naive-bayes classifier) are then used to investigate whether the narrative form follows narrative function.

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Metabolic Efficiency and Mechanics of Walking On Sloped Terrain

This study aims to explore the effect of limb segment lengths in the efficiency of slope-walking. We anticipate that individuals with shorter distal limb segments in the lower limb will demonstrate greater metabolic efficiency when walking on an incline, and will require less activation of the ankle plantar flexors when assuming a fore-foot ("toe walking") posture. Measurements of the thigh, shank, foot, big toe, pelvis width, height, and weight will be recorded and reflective motion capture markers placed on 13 locations on the foot, anterior and posterior superior iliac spines, femoral epicondyles, and the lateral and medial malleoli of the subjects.

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EXAMINING MULTIPLE PROTEIN ISOFORMS IN BACTOFILINS OF M. XANTHUS AND C. CRESCENTUS

Bactofilins, a class of cytoskeletal proteins exclusive to bacteria which are present in all phyla, have become an increasingly researched subject in microbiology. These proteins contain a highly conserved DUF583 domain surrounded by poorly conserved N and C termini. Our studies focus on two bactofilins in C. crescentus, bacA and bacB, along with four bactofilins in the soil-dwelling bacteria, M. xanthus, bacM-P. It was previously believed that the BacM protein, which exists in multiple isoforms, matures by proteolysis. However, our lab has discovered the presence of multiple start codons in the bacM mRNA, which results in initiation of translation of two different protein isoforms. To test if multiple isoforms of other bactofilins exist, plasmids were engineered to contain sequences of bactofilins found in C. crescentus (bacA and bacB) and M. xanthus (bacN-P) along with an epitope (FLAG) tag at the 3' end. This plasmid was transformed into either C. crescentus or M. xanthus and analyzed by immunoblot via anti-FLAG antibody. Preliminary findings indicate that BacM is the only bactofilin to be expressed as multiple isoforms out of the bactofilins studied in M. xanthus and C. crescentus. Future studies include mutagenesis experiments to identify the true start site of transcription of the

bacA and bacB genes as well as confirming the expression of multiple isoforms in bactofilins of P. mirabilis, as well as determining the mechanism by which these isoforms arise.

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COMPARISON OF TWO NYC WATER QUALITY DATABASES OBTAINED THROUGH THE GOVERNMENT AND A CITIZEN SCIENCE GROUP

The New York City Water Trails started its Citizens' Water Quality Testing Program (CWQTP) in 2011 in response to an unprecedented sewage leak from the North River Wastewater Treatment Facility in Manhattan. The program has grown and expanded through the years, and has continued to add sampling sites. St. Francis College was added as a sampling site in 2018. Despite the pandemic, the CSWQTP proceeded, albeit it at less locations. The CSWQTP uses an USEPA approved Enterolert system from IDEXX Laboratories that samples for enterococci, which can live and thrive in brackish as well as fresh water. The NYDEP uses a boat for sampling dissolved oxygen (DO), chlorphyll, clarity, nitrogen and salinity as well as bacteria. This study is a comparison between the CSWQ program and the NYC Department of Environmental Protection (NYDEP) sampling program.

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Invasional Meltdown: The dispersal of the non-native C. incisa in a non-native dominated ecosystem

Corydalis incisa (Incised fumewort) is a myrmecochorous (ant dispered) non-native invasive plant located along the Bronx River and other watersheds in Westchester County and the Bronx. This region also has a high diversity of native myrmecochorus plants such as Asarum canadense (wild ginger) that may be negatively impacted by this invasion. Between June to August 2019, ants were found to disperse the seeds of C. incisa and A. canadense in both native and knotweed invaded areas. The most commonly found ant in pitfall traps and on C. incisa seeds was the non-native Nylanderia flavipes, not Aphaenogaster rudis as expected. C. incisa is being successfully dispersed more than the native A. canadense in knotweed-dominated areas, which are

particularly common along the Bronx River. In addition, the non-native ant, Nylanderia flavipes is playing a critical role in its dispersal. We argue that our data is a possible example of an invasional meltdown whereby a non-native ant facilitates the spread of a new non-native herbaceous plant more often in sites that are dominated by the invasive Japanese knotweed. Due to Covid-19 these experiments were unable to be fully repeated in summer 2020. We did however find that C. incisa is increased in abundance and range during that time period. We plan to repeat this study in summer 2021 and additionally use Winkler bags to better sample the ant community.

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DI-BUTYL PHTHALATE (DBP) INDUCES DEFECTS IN EYE DEVELOPMENT IN ZEBRAFISH

Di-butyl phthalate (DBP) is commonly added to make plastics softer and more pliable and is found in a variety of consumer and industrial products. Alarmingly high levels of DBP have been detected in water and sediment as DBP leaches from products. The Environmental Protection Agency has labeled DBP as a priority environmental pollutant and the European Commission as a priority substance. Given the ubiquitous presence of DBP globally and continuous exposure to DBP, studies on the developmental toxicity of DBP are needed. There is a wealth of literature supporting the endocrine disrupting effects of DBP, but developmental toxicity of DBP during critical developmental time windows is understudied. Here, we investigate the developmental effects of DBP exposure during early development. We treated gastrula staged zebrafish embryos with concentrations of DBP that have been environmentally noted. We find defects in eye development including a decrease in the size of the lens and retina in DBP treated embryos, but the intraocular distance was increased compared to controls. Defects in vascular and neuronal patterning were also noted. Here we conclude that exposure to environmentally relevant doses of DBP during crucial time windows of embryonic development is toxic to eye development.

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COMPUTING AFFINITY BETWEEN ESTROGEN RECEPTORS AND MODIFIED OXYBENZONE

Oxybenzone (benzophenone-3/BP3), an ultraviolet (UV) filter commonly used in sunscreens, is similar in structure to the estrogen hormone. This study employed the Small Molecule Drug Discovery suite (Schrödinger Inc.) to compare binding affinity of BP3 with binding of estradiol to human estrogen receptors (hERs). Docking studies were performed utilizing the Glide docking module. The energy minimized structure of BP3 was docked into two hER crystal structures (PDB access codes: 3UU7 and 1A52). We also simulated modified forms of BP3 in order to evaluate whether estrogen mimicking effects of BP3 could be reduced. We selected functional groups from other common organic UV filters to modify BP3. The electronic structure of the most promising candidates will be further analyzed computationally for UV filtering effectiveness. A form of BP3 with low hER affinity and effective UV filtering would benefit public health by allaying consumer concerns, thus bolstering sunscreen use and mitigating skin cancers.

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INVESTIGATING THE ROLE OF PREFRONTAL CORTEX ASTROCYTES IN SPATIAL WORKING MEMORY

Astrocytes are glial cells within the brain that influence blood flow, energy production, and neurotransmitter and ionic balance. All of these functions are critical for neuronal activity and synaptic plasticity, which are critical components of memory. The current study focuses on the relationship between spatial working memory (SWM) and astrocytic activity. We employed a chemogenetic technique (Designer Receptors Exclusively Activated by Designer Drugs, or DREADDs) to activate astrocytes in rats during a spontaneous alternation task. We targeted the prefrontal cortex, a region associated with SWM performance, through bilateral injections of either hM3D(Gq)-mCherry, the designer receptor, with a GFAP promoter or an eGFP control virus. Rats were tested twice on the spontaneous alternation task: control and experimental rats were subjected to intraperitoneal injections of both the corresponding hM3D(Gq) receptor agonist Compound 21 (C21) and saline 30 minutes before testing each day (1 injection per day). Preliminary results uncovered an unexpected effect of high doses of C21 such that 3 mg/kg of C21

significantly inhibited the number of arm entries made. However, this effect was not seen with a dose of 1 mg/kg. Additionally, at the lower dose there are trends for improvements in spatial working memory when DREADDs astrocytes are activated with C21. Moving forward, we plan to examine the effects of sex differences, as astrocytes have receptors for estrogens. Our research indicates astrocytes play an integral role in memory processes in the prefrontal cortex and are a novel target for neurotherapies in neurodegenerative diseases.

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ISOLATION AND CHARACTERIZATION OF ACIDITHIOBACILLUS FROM THE IROQUOIS NATIONAL WILDLIFE REFUGE

The Iroquois National Wildlife Refuge is a wetland environment home to several cold acidic sulfur springs with unique chemical compositions that yield different microbial communities. Each of the springs sustain active populations of Acidithiobacillus. Acidithiobacillus is known to be capable of bioleaching, and strains are currently used in the mining industry. While most cultured representatives of Acidithiobacillus are found in acid mine drainage, our strains are relatively rare in that they are found in a naturally occurring acidic environment. Samples from the two springs in the refuge were used to inoculate enrichment cultures, with intentions to isolate, identify, and characterize the Acidithiobacillus in the spring. By characterizing the Acidithiobacillus isolates through establishing optimal growth, sequencing the 16S rRNA gene, and determining bioleaching capabilities, we will be able to better understand how natural isolates differ from isolates obtained from anthropogenically impacted environments. The bioleaching capability of these isolates is of particular interest for future work because natural isolates may offer unique characteristics that can contribute to a more eco-friendly metal extraction process.

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SPECTROSCOPIC DIFFERENTIATION OF BEE PROPOLIS EXTRACTS

Propolis is a multifunctional material collected and used by honey bees in the construction and maintenance of their hives. It has been used in folk medicine for centuries. The absorbance of ethanolic extracts of propolis (EEPs) samples collected from 4 different regions in the United States namely Northeast (New York and Maine), South (Alabama and Mississippi), Midwest (Michigan and

Ohio) and West Coast (California and Washington-Oregon) were obtained. Over-all visual inspection of the absorbance profile showed differences in most samples even those coming from the same region. The only exception are those from California and Ohio samples that almost has the same absorbance profile. In addition, derivative spectroscopy was also performed to further differentiate the difference between the propolis samples. It was also observed that the absorbance profile of all propolis samples changed with aging with absorbance increasing in samples that was stored for more than a year.

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CHANGES IN DEPRESSION, ANXIETY, STRESS, SOCIAL SUPPORT, SUBSTANCE ABUSE, SOCIAL MEDIA USE, AND EATING DISORDERS DURING THE 2020 COVID-19 PANDEMIC

The COVID-19 pandemic has been widely hypothesized to have a negative impact on mental health and wellbeing. The current study explores the impact of COVID on anxiety, depression, perceived stress, social support, eating disorders, substance abuse and social media use. Data was collected from 176 undergraduate subjects from January 2020 through November 2020, and divided into three phases: Pre-COVID, Remote Late-Spring, and Remote Fall Semesters. No overall changes in levels of stress or depression were reported. Anxiety levels dropped during the remote late-spring semester, and these changes trended towards significance. Results also indicated that social support from friends increased significantly during this period, and similar changes in social support from family trended towards significance. There were no significant changes in substance abuse, eating disorders or social media use over the course of the study. Replicating the findings of other studies, eating disorders and anxiety were positively correlated with compulsive internet use, and anxiety was strongly associated with eating disorders. Depression and anxiety were negatively associated with both family and friend social support. Social support from family was negatively associated with marijuana and CBD use. Social media use was positively associated with perceived social support from friends. These findings are discussed and the limitations of the study are outlined, and future recommendations for research are provided.

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HYDROTHERMAL PREPERATION OF TITANIUM DIOXIDE (TiO2) FROM PRECURSORS SYNTHESIZED BY THE OXIDANT PEROXO METHOD (OPM)

The ability to produce phase pure and compositionally controlled nanomaterials at temperatures lower than the ones required by solid state reaction methods is one of the most important features in a solution-chemistry synthetic method. The sol-gel based methods usually use many organic compounds throughout the synthetic process, which can be detrimental to certain applications, as high quantities of residual carbon can be found along the final product. The Oxidant Peroxo Method, usually known by the acronym OPM, is a solution-chemistry method based on the production of peroxo complexes with hydrogen peroxide and different transition metal ions at alkaline pH. The production of these peroxo complexes leads to an amorphous material that upon calcination produces phase pure transition metal oxides with controlled composition. One special feature of the OPM method is the use of inorganic sources of titanium during the synthesis, which avoids the presence of undesired pyrolyzed organic molecules mixed with the metal oxide product. In this work, the amorphous peroxo complex precursor has been prepared at room temperature and use in the hydrothermal treatment using to prepare titanium dioxide (TiO2) nanoparticles. The main parameter studied was the variation in the concentration of the surfactant Cetrimonium bromide (CTAB) to see how this affects the nanoparticle size and morphology. The materials were characterized by X-ray diffraction (XRD) and infrared spectroscopy to verify the crystalline phase of the TiO2 and the presence of the CTAB functional groups in the TiO2 surface.

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GENDER ROLES AND SELF-ESTEEM

Do traditional gender role beliefs decrease the self-esteem reported by collegiate women? Past research explicitly assessing gender roles and self-esteem has conflicting results. A study containing female college women used two explicit measures that measured the participants' masculinity or femininity and their attitudes towards the gender roles of women. The results showed that participants who believed in the traditional gender role reported lower self-esteem than participants with a modern gender role belief (Kleinplatz et al. 1992). Other research has suggested that gender roles do not have an effect on the self-esteem of women. A study containing both male and female participants, who worked at the same health care facility, found that the gender

role stress each individual faced at work had no significant effect on self-esteem (Kargin et al., 2020; Akın, 2017; Kurucu, 2019). The literature pertaining to the effect gender role beliefs have on women's self-esteem is therefore not conclusive. Literature that implicitly, as compared to explicitly assesses a women's gender role beliefs and self-esteem may be able to clarify the relationship between gender role and self-esteem. Past research that implicitly assessed women's gender role beliefs and self-esteem did not contrast it with explicit findings (Aidman & Carroll, 2003). I hypothesize that implicit traditional gender role beliefs will decrease participant's implicit self-esteem when compared to explicit gender role beliefs. Undergraduate women will complete a web survey assessing implicit and explicit gender role beliefs and self-esteem. Correlation and regression analyses will be used to examine the results. Implications for the implicit effect on self-esteem will be discussed.

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THE CHARACTERIZATION AND DETAILED BIOINFORMATIC STUDY OF NOVEL STAPHYLOCOCCUS BACTERIOPHAGE

Staphylococcus aureus is responsible for multiple diseases which are currently being treated by antibiotic drugs. Methicillin-resistant Staphylococcus aureus (MRSA) is a major biomedical concern due to the lack of effective treatment, as antibiotics become ineffective against this pathogen. An alternative is to use bacteriophage to control Staphylococcus. A number of novel phage have been isolated from the nares of white tail deer, Odocoileus virginianus. DNA sequence analysis indicates that they belong to the Siphoviridae family. This research explores a bioinformatic approach to investigate the detailed analysis of the genome composition of 13 isolated phage. This analysis will allow for future prediction of gene functions, comparison to characterized phage, and analysis of sequenced Staphylococcus aureus genomes for phage genes similar to our phage.

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ARE GENETIC DIFFERENCES IN VARIOUS ETHNICITIES CORRELATED WITH SURVIVAL RATE IN BREAST CANCER?

This study aims to see if breast cancer gene variants are shared or unique among different ethnicities (African American, European American, Iranian, Brazilian, Pakistani, Jewish, Columbian, and Hispanic/Latino) and to ascertain if they are correlated with survival rate. Sample results include: A total of 61 BC patients (59 F and 2 M) of Iranian descent were wild-type for BRCA1 and BRCA2 mutations. A total of 95 individuals with hereditary breast and ovarian cancer (HBOC) syndrome clinical suspicion in Brazil were sequenced and 25 samples were evaluated for insertions/deletions in BRCA1/BRCA2 genes. Another result that indicates a correlation of BC in various ethnicities with survival rate is seen in triple negative breast cancer (TNBC); (these represent 10-15% of breast tumors diagnosed each year). This type of cancer, which has a poor prognosis, is more common among African American (AA) and Hispanic-Latina (HL) women. In total, the high risk breast cancer genes, BRCA1, BRCA2, TP53, STK11, CD1 and PTEN account for approximately 20% of the familial risk in the ethnicities listed above.

Jason DeBoard, Rose Dietrich, Angela Croop, James Hughes, James Oschal Wilkes University.

CHARACTERIZATION AND CORRELATION OF NEURODEGENERATION AND BIOLOGICAL MARKERS OF MODEL MICE WITH TRAUMATIC BRAIN INJURY AND ALZHEIMER'S DISEASE

Alzheimer’s disease (AD) is a predominant type of dementia and major cause of neural network impairment. There are currently no known cures for the disease. Early detection to impede its progress is the current standard. Beyond age and genetics, another prevalent risk factor for AD might be traumatic brain injury (TBI), which has similar neurodegenerative hallmarks. Our research focuses on obtaining information and methods to be able to predict when neurodegenerative effects might occur at a clinical level by observation of events at a cellular and molecular level in mice. We introduce our evidence that brain damage can be observed via brain imaging prior to noticeable loss of neuromuscular control in AD model mice. We then show our evidence that some blood biomarkers might be able to be early predictors of AD in the mice. Here we search early predictors of long-term neurodegenerative effects due to differing degrees of TBI and AD, and what level of TBI causes further damage and earlier death to the AD mice. Upon application of TBIs to induce extremely mild TBIs, wild-type (WT) mice and AD mouse models were tested for epileptic activity, neuromuscular control, olfactory ability, blood biomarkers, and brain imaging. Our data suggests that neuromotor control and olfactory function diminish for both AD and WT mice after the administration of multiple consecutive, mild TBIs. Greater enhancement of AD symptoms is observable in older mice compared to younger mice following TBI. Sustained TBI causes both accelerated and exacerbated AD symptoms in AD model mice.

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NON-MIGRATORY HONEY BEE (APIS.MELLIFERA) COLONIES PERISH DURING WINTER DUE TO POSSIBLE PATHOGENS TRANSMITTED BY VARROA DESTRUCTOR

Honey bees (Apis mellifera) are a keystone pollinator species in the anthropocentric world as they are able to pollinate effectively over a large area, which qualifies this species to be extremely important for many crops. Ironically the number of bee colonies is decreasing at an alarming rate, even as their demand for pollination is increasing. The mite, Varroa destructor is a parasite of bees that can also be a vector for numerous be viral diseases. This is the largest threat to the bee industry, accounting for up to 60% of losses of colonies every year. This is not a sustainable situation. The current study

analyzes mite load on local non-migratory beehives that have died through the winter. Testing for viruses will also be performed.

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ANNOTATION OF A NOVEL MICROBACTERIUM FOLIORUM PHAGE PARLEG

Bacteriophages are highly specific viruses that infect and replicate only in bacteria. Considered to be the most predominant biological entities on this planet, we are only beginning to understand their remarkable diversity and evolutionary patterns in response to the selective pressures from their hosts. Aiding our understanding has been the renewed interest in the sequencing and annotation of the phage genomes. We are part of the SEA PHAGES consortium, a Howard Hughes funded initiative dedicated to providing undergraduate students an opportunity to do novel research using soil bacteriophages as a model system. In this study we describe the annotation of a Microbacterium foliorum phage ParleG, isolated from a soil sample found in Philadelphia, Pennsylvania in 2019. Part of the EA1 cluster, ParleG has a genome size of 41,810 bp. Genome annotation is the process of identifying and describing the function of genes using an in silico approach. We used a variety of bioinformatics programs that predict gene locations (Glimmer and GeneMark), their start sites (Starterator), potential functions (HHpred, NCBI Blast) and the presence of putative tRNAs (ARAGORN, tRNAscan) in this study. Our annotation demonstrates that the genome of ParleG contains 63 genes, for which the function of 26 is currently known. The genome did not contain any tRNAs but did contain various proteins of interest such as a holin and an endolysin. We are currently doing finer analysis of this genome. The annotation of ParleG has been submitted to GenBank (Accession number MT553343.1) for use in future wet lab projects.

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MINDFULNESS, EMPATHY, AND ROMANTIC BELIEFS

The current study explores the effect of mindfulness and empathy on romantic beliefs. The construct of Romantic Beliefs reflects an individual's personal philosophy, values, or schemas for fulfilling love relationships. It includes the sub-constructs of “idealization,” “love finds a way,” “love at first sight,” and “one and only.” We hypothesized that those higher in mindfulness would be more likely to endorse the belief that “love finds a way” and less likely to believe in “love at first sight,” “one and only,” and “idealization.” Additionally,

we hypothesized that empathy would be positively correlated with both "love finds a way" and "love at first sight." The current analysis is restricted to women only. Subjects (N=142) were asked to complete a questionnaire that included the Cognitive and Affective Mindfulness Scale-Revised, the Toronto Empathy Questionnaire, and the Romantic Beliefs Scale. Mindfulness was positively correlated with the belief "love finds a way," a tendency towards "idealization" of partners, and the belief that there is "one and only" partner for them. Contrary to our hypotheses, mindfulness was associated, in places, with more traditional views of romantic relationships. Additionally, the results show that empathy was negatively correlated with "love at first sight" and positively with "love finds a way." These unexpected results suggest that there is a complex relationship between facets of romanticism and these personality traits. Further research is needed, as is replication, and future studies should be completed with male subjects to see if these patterns are similar in men.

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PATTERNS OF GRAZING AND PHENOLIC CONTENT WITHIN RESTORED AND NATURAL SPARTINA ALTERNIFLORA MARSHES

Spartina alterniflora is an abundant plant species in salt marshes across the United States. Salt marshes provide protection from erosion by trapping sediments and help prevent flooding, but a variety of factors have contributed to the loss of valuable marsh habitats. Restored salt marshes are increasing in number to combat marsh loss, so understanding how restored plants interact with other marsh species is crucial. If restored plants produce fewer chemical defenses or experience more grazing than natural marshes, they might not perform as well as natural marshes. To assess the occurrence of grazing and patterns of chemical defenses in restored vs. naturally occurring S. alterniflora, we collected S. alterniflora leaves from three locations within Stratford Point, Connecticut: 1) planted in 2015, 2) planted in 2017, and 3) naturally occurring. We then used ImageJ to measure the percent area with visible grazing scars on each leaf and calculated the percent area grazed for each leaf. Significantly more grazing occurred in the 2015 planting group in comparison to the 2017 planting and the natural group. To determine if there was a link between chemical deterrent production in the leaves and the amount of grazing on the plants, we measured the phenolic content of freeze-dried and ground leaf tissue using the Folin-Denis assay. Phenolic analysis is still underway, but we expect to see lower phenolics in the more heavily grazed plants. Our results can shed light on the role of herbivores in restored marshes, ultimately improving the success of future marsh restoration projects.

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THE EFFECT OF PARK VISITORS ON MICROBIAL COMMUNITIES

Fillmore Glen State Park, New York, is a campground that allows pets on the premises and also lets humans bathe in their water. Because humans and pets act as vectors for bacteria, having these policies may change the microbial community structure of the water. Some common bacteria that may be found in the water because of increased human activity include Salmonella and Shigella. Pets that are brought by visitors can also carry Salmonella, as well as E. coli. To further investigate microbial life at Fillmore Glen State Park, samples were collected near the waterfall in three different locations; upstream, downstream, and still water from the recreational pool. These different locations were selected because they are expected to have different dissolved oxygen concentrations which may impact which microbes thrive in each sample. The 16S gene was sequenced from the total genomic DNA of the water in order to characterize the bacterial communities in said environments. Because the ribosomal gene is strongly conserved and crucial to the organisms' life, it will help us differentiate between taxa in our samples. With this information we can compare the bacterial diversity of Fillmore Glen State Park's water with parks that are less pristine.

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THE EFFECT OF BIOCHAR ON CARBON DIOXIDE PRODUCTION IN VERMICOMPOSTING AND NORMAL COMPOSTING

American colleges are responsible for throwing out over 22 million pounds (almost 10 million kilograms) of food waste a year. In addition, colleges are required to maintain and pay for expensive dumpsters to store wasted food. Vermiculture, or composting with worms, has the potential to sustainably manage organic waste from college campus while creating high quality compost. Composting with biochar as an additive has been shown to increase carbon sequestration and mineralization, but only in certain conditions. It was hypothesized that adding biochar to Eisenia foetida vermiculture would produce less carbon dioxide than vermiculture alone. Six worms were added to yard waste, half of which contained 10% biochar by weight. These were compared to controls containing yard waste without worms, half of which contained 10% biochar. Sodium hydroxide traps were placed in each container and were

titrated weekly to measure carbon dioxide emissions. After four 1-week trials, no apparent difference was observed between the experimental and control groups or across the duration of the experiment. We think that the sodium hydroxide trap methodology was not precise enough for our research question and are revising the experiment. The new experiment will use an infrared sensor that will be made using Arduino programming (a SMACC machine). We also will use lower amounts of biochar in the medium, ranging from 5% to 10% and a higher sample size.

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DOES PROXIMITY TO CULTIVATED HIVES IMPACT GENETIC DIVERSITY IN SCAEVOLA PLUMIERI?

Scaevola plumieri (S. plumieri) is a coastal dune species typically found on tropical and subtropical beaches in the Indo Atlantic. Native and introduced honeybees are known pollinators of this plant. Little is known about the relationship between S. plumieri genetic diversity and its proximity to honeybee populations. In this study, we are researching how the genetic diversity of S. plumieri is impacted by the proximity to apiaries on the island of Vieques, Puerto Rico. To do this, S. plumieri individuals were collected from three beaches that varied in their distance from two apiaries. DNA was extracted from each of the plant individuals and four microsatellite regions were amplified using previously developed primers. Peaks of microsatellite alleles were analyzed and scored using Geneious software. Peak scores were recorded in Excel for genetic analysis using GenAlEx software. Hardy Weinberg Equilibrium (HWE), Analysis of Molecular Variance (AMOVA), Mantel, and allele variant tests were used to assess genetic diversity of the three populations. Overall, the test results implied that the hives did not have an impact on the genetic diversity of S. plumieri populations studied.

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HIGH THROUGHPUT CARBON NANOTUBE FIELD EFFECT TRANSISTOR ASSEMBLY FOR RAPID SENSOR DEVELOPMENT

Due to its adverse effects on human organ systems and its common use in solvents, isopropyl alcohol (IPA) has become a target analyte within the United States Air Force (USAF). Currently, there are no commercially available sensors that can selectively detect IPA, including the industry standard of photoionization detectors. Thus, researchers have moved to develop more

advanced sensor platforms to achieve selectivity. USAF researchers choose carbon nanotubes (CNTs) for their unique electrical properties. The dispersion of CNTs within a solution allows for the reorientation and functionalization of carbon nanotube bundles to form field-effect transistors (FET) through dielectrophoresis (DEP). Researchers have found that selecting polyvinyl pyrrolidone for the dispersive agent creates an environment selective for IPA. Combining these two findings, CNT-FETs coated in polyvinyl pyrrolidone selectively detect IPA over similarly structured volatile organic compounds. The current study focused on evaluation of simultaneous DEP to hasten the development of FETs using the USAF designed electrode platforms. Evaluation of the produced CNT-FETs was conducted using both semiconductive analyzers and supported by scanning electron microscopy. Simultaneous DEP worked and was shown to be repeatable, and preliminary results show a 56% yield of functional CNT-FETs, which was never achieved before for the chosen microchip platform.

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ANTIOXIDANT ACTIVITY OF BEE PROPOLIS EXTRACTS FROM THE UNITED STATES

Propolis is a natural resinous substance collected by honey bees from buds and exudates of trees and is used by bees as a glue, general-purpose sealer and draught extruder for beehives. Known in folk medicine since ancient times, propolis has attracted much attention in recent years as a useful ingredient applied in medicine, domestic products, and food products since it possesses various biological properties including antimicrobial, antioxidative and antiulcer properties. In this study, ethanolic extracts of propolis (EEPs) samples from the United States was determined for antioxidant activity using 2,2-diphenyl-1-picrylhydrazyl or DPPH assay and correlated with its phenol content using Folin-Ciocalteu’s reagent. Among the eight samples used, those obtained from California and Ohio showed strongest antioxidant activity and highest phenol content.

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THE IMPACT OF CHRONIC PSYCHOLOGICAL TRAUMA ON MEMORY AND SOCIALIZATION IN RATS

This study investigated the impact of chronic psychological trauma on memory, socialization, food consumption, water intake, and body weight in male and female Long Evans rats. The experiment involved a one-week habituation period followed by a three-week experimental period. To induce chronic psychological stress during the experimental period, the cages of the experimental rats of both gender groups were encircled with violent images of rats. The control rats were not exposed to these pictures. At the end of weeks two and three of the experimental period, spatial working memory was tested through the Morris Water Maze (MWM). The MWM assessment was divided into two trials (sample and test). Additionally, at the end of the third experimental week, experimental and control rats of the same gender were paired and socialized to assess aggression, which was measured using a nine-point scale. It was concluded (1) that chronic psychological trauma does not negatively affect spatial working memory for either gender, but the rats of all groups demonstrated learning between the sample and test runs, (2) traumatized rats are more likely to display aggressive behavior after experiencing chronic psychological trauma, regardless of gender, and (3) experimental rats consumed more food and water than the control rats, resulting in a higher body weight. Additionally, male rats weighed significantly more than female rats as a result of their increased food and water intake.

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ZOOPLANKTON RELATIVE ABUNDANCE: FAYETTEVILLE GREEN LAKE

Fayetteville Green Lake is a meromictic lake found in upstate New York. Green Lake is a unique place due to its high sulfur content, permanently stratified monimolimnion, purple and green sulfur bacteria, and its freshwater coral reefs. Measurements of the zooplankton abundance in the lake have been absent since Culver et al. assessed the community in 1967. Zooplankton samples were collected in October of 2019 using a 63μm net and preserved with ethanol. Samples were identified to species and measured in the laboratory under a dissection microscope. Relative abundance and size frequency were then calculated using the data. Leptodiaptomus sicilis was found to be the most abundant species, followed by the Epischura lacustris, and Daphnia pulex, with some copepod nauplii found throughout the samples. The zooplankton community did not drastically change from the 1967 to 2019. This

is important to know so that we can observe the effects climate change and other environmental factors have on zooplankton populations.

Elizabeth Kelsey - Gossard, Dr. William Edwards, Dr. Cassandra Marnocha, Professor Coleen Edwards, Biology Department, Niagara University, Niagara University, New York, 14109

ZOOPLANKTON GUT ANALYSIS USING MICROBIAL 16S RRNA GENE SEQUENCING

Fayetteville Green Lake is a meromictic lake located south of Syracuse, NY. Due to the lack of seasonal mixing and its unique sulfidic conditions, the producers, including cyanobacteria, green and purple sulfur bacteria, and eukaryotic algae, found in Fayetteville Green Lake, are vertically stratified. A study by Culver et al in 1967 described the zooplankton community and its vertical distribution of Fayetteville Green Lake. Our goal is to understand the feeding behavior of zooplankton in relation to the community interactions of the lake. There is no current standardized protocol for isolating bacterial DNA from zooplankton through a microbial gut analysis. We developed a protocol to extract sufficient bacterial DNA for identification of bacterial species found within the zooplankton gut. Following the DNA extraction, we sent the samples to be analyzed using 16S rRNA gene sequencing allowing identification of bacterial populations to species. With time, this protocol will allow for determination of species specific feeding niches of zooplankton.

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AN ADVANCED SIMULATION MODEL TO PREDICT THE IMPACT OF COLLATERALLY SENSITIVE DRUG CYCLES FOR CANCER THERAPY

Chemotherapeutic agents are the cornerstone regimens to treat human malignancies. However, in many cases, chemotherapy is not successful due to development of drug resistance. The hallmark of the process is when a drug is not able to elicit a therapeutic response at recommended protocols. One of the main strategies to counter this problem is the sequential application of drugs. The process is followed through a phenomenon known as collateral sensitivity

where resistance to one drug displays higher sensitivity to another drug. To solve this problem optimal therapy scheduling based on a pair of collaterally sensitive drugs has been explored in this study. Our previous model described the effects of sequential drug pairing on the structure of cell classification considering the resistance and sensitivity against the drugs. Despite advantages of the simplified modeling setup to derive analytical work, the previous model is limited to understand cellular heterogeneity. In our advanced model, we added a new cell type that is not treated by either drug in the collaterally sensitive drug pair. Hence, based on our simulation model, we conclude that the introduction of a third type can describe the situation that the resistance developed even under the optimal scheduling of the drugs.

Ryan Kim, Institute of NeuroImmune Pharmacology and Department of Biological Sciences, Seton Hall University (South Orange, NJ, 07079)

NETWORK META-ANALYSIS ON THE MECHANISMS UNDERLYING INFLAMMATORY DISEASES AND EXPOSURE TO ALCOHOL ACTIVATION OF NEUROINFLAMMATION SIGNALING PATHWAY

Using QIAGEN Ingenuity Pathway Analysis (IPA), 28 molecules were identified overlapping between those affected by ethanol and those associated with 11 inflammatory diseases. IPA Core analysis of these 28 revealed that Neuroinflammation Signaling Pathway (NISP) was the top with p-value 2.52E-24. Among these 28, 12 outside NISP and the following 16, CASP1, CCL2, CRP, IFNG, IKBKB, IL4, IL10, IL12B, IL1R1, MMP9, MYD88, RELA, STAT1, TGFB1, TLR4 and TNF within NISP. Core analysis of these 16 revealed NISP to be the top with a lowered p-value than that for all 28. Core Analysis of the 12 revealed that NISP was not one of its pathways with p-value <0.05. Due to the decreased p-value and the consistent NISP top ranking when the 12 were excluded, further analyses were conducted to identify the least molecules required with NISP as top. Core Analysis of reduced numbers of molecules from 15 to 6 revealed that p-values increased with each exclusion, suggesting lessened NISP association while NISP has remained top. Based on all analyses, the 6 molecules, CASP1, CCL2, CRP, IFNG, IKBKB, and IL4, were found to be the least number to have NISP as top. The effects of each molecule on activation of diseases within NISP were studied to reveal that these 6 collectively lead to onset of diseases including Blood-Brain-Barrier (BBB) Disruption, GABAergic neuron density, Neurofibrillary tangles, Astrogliosis, Amyloid-beta fibrils phagocytosis, and neuron damage. The molecular pathways of these 6 may underly alcohol drinking activation of NISP leading to brain diseases (supported by U01AA025964).

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CLONING GLYCOSIDE HYDROLASES

Recombinant proteins have a vast potential of medical applications. One such application is using glycoside hydrolases in order to remove surface sugar residues on red blood cells. Red blood cells have sugars on the cell surface that are responsible for bloods' antigenic properties. These residues react with antibodies present in blood plasma and result in clotting upon recognition of a foreign antigen such as incompatible donor blood. These sugars distinguish the three blood types as A, B, and O. It is proposed that using glycoside hydrolases found in Paenibacillus JDR2 will result in a means to alter or remove the surface sugars sufficiently to prevent recognition by recipient antibodies. The genes for these enzymes were cloned and expressed in E. coli. using the Pet15b vector. The resulting transformants were used to obtain pure plasmids containing the gene of interest to be transformed into the BL21(DE3) E. coli strain for expression.

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INVESTIGATING THE CONTRIBUTIONS OF BACM ISOFORMS TO MYXOCOCCUS XANTHUS CELL SHAPE AND ANTIBIOTIC RESISTANCE

Bactofilins are a class of cytoskeletal proteins found in a range of bacterial species. One such bactofilin gene in Myxococcus xanthus is bacM, responsible for the maintenance of proper cell wall shape and resistance to certain classes of antibiotics. Two bacM isoforms are expressed in M. xanthus by the inclusion of two independent start codons of the gene. The expression of two isoforms suggests that each contributes to BacM activity, though the exact function of individual isoforms and the necessity of both proteins being expressed is unknown. A crooked cell shape is observed in ΔbacM mutants, differing from its wild-type rod-shaped phenotype, and mutants demonstrate an increased sensitivity to antibiotics. To test the individual contributions of each isoform to overall BacM activity, single isoform mutants of M. xanthus were engineered via PCR mutagenesis and expression was confirmed by immunoblot. Using microscopy and antibiotic sensitivity assays, we attempt to determine the

contributions of each protein isoform to maintain cell wall shape and for cells to survive antibiotic stress.

Christian Machado, Yelda Balkir, Department of Chemistry and Biochemistry, Manhattan College (Riverdale, NY, 10471)

SYNTHESIS OF BIOFUELS FROM WASTE MATERIALS

The price of the raw materials and product refinement associated with the current method of biodiesel synthesis affects the adoption of renewable alternative energy on a large scale. Coffee oil is a renewable source of feedstock for biodiesel synthesis because it can be extracted from waste coffee grounds. Homogeneous catalysts are the most commonly used catalysts in biodiesel production, but they are harmful to the environment and heavily contribute to the processing costs associated with the production of the fuel. Heterogeneous catalysts are recyclable and a more energetically and cost-efficient choice of catalyst. The heterogeneous catalyst calcium oxide (CaO) is a sustainable alternative to homogeneous catalysts like potassium hydroxide (KOH), though it displays lower in situ reactivity and stability than its active phase of Ca-glyceroxide. In the present work, purchased coffee oil first underwent a Fischer esterification pretreatment to lower its % FFA content before its use as feedstock in the transesterification reaction. Ca-glyceroxide was synthesized in the laboratory and successfully catalyzed the conversion of coffee oil to fatty acid methyl esters (FAMEs), or biodiesel. X-ray Powder Diffraction (XRD) and Scanning Electron Microscopy (SEM) confirmed the formation of the active phase catalyst, and 1H NMR and FTIR were used to analyze the conversion of the feedstock to biodiesel.

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THE RELATIONSHIP BETWEEN FISH CONSUMPTION AND HUMAN HEALTH

In this benefit-risk observational study, it is expected that there are more favorable health outcomes than there is harm with consuming fish. Healthy omega 3 oils were found from a variety of fish such as salmon, mackerel and tuna. Conversely, fish taken from certain waters contained methylmercury, which caused people to reduce their consumption of fish. Moreover, fish collected from the Great Lakes and Hudson River have contained organic pollutants and dioxins, and guidelines have been issued that caution limits to

fish consumption. One encouraging study in lake trout fillets showed a concurrent reduction in PCB's (5200 ng/g to 100 ng/g and dioxins (16 pg/g to 9 pg/g) in Lake Ontario, and a reduction of mercury (0.9 ug/g to 0.2 ug/g) over a 40-year period from 1970 to 2010. Another finding is that modern diets have 10-25 times as much omega 6 lipids than omega 3's, whereas in the past the amounts were equitable. Eating a fish diet can increase omega 3's in the diet, as well as bone mineral density. However, pollutants such as mercury, PCB's and dioxin might offset these benefits. We would like to fine tune out study to include additional nutrients/contaminants found in fish as well as differences in nutritional content of farmed versus wild fish.

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EFFECTS OF USING PHYTOPLANKTON OR ZOOPLANKTON AS A FOOD SOURCE FOR DUNCANOPSAMMIA AXIFUGA

To understand how best to restore damaged coral reefs, one must first understand how best to nurture and grow fragments of coral. For our purposes, we used the Indo-Pacific, coral Duncanopsammia axifuga as a model organism, as it is integral to the reef ecosystem both structurally and ecologically, as well as it is readily available to scientists, since it is not a threatened species. The controlled lab experiment was set up in a way that two replicate groups were isolated when fed, one group was fed 30mL of phytoplankton three times a week, while the other was fed zooplankton on the same three days. We recorded how long the corals actively fed, and comparisons were made along the duration of the project regarding starting size, number of polyps, amount of sprouting polyp buds, and in the future, we hope to analyze the density of the coral's skeleton between the two groups. We expect our results to be able to help provide valuable information for coral reef restoration projects for years to come.

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IDENTIFYING NOVEL SPLICE FACTORS: DEPLETION OF MTDNA FROM WHOLE GENOME SEQUENCING SAMPLES IN YEAST

Regulation of gene expression is an important process in all organisms. The information in DNA must be copied to mRNA and translated to protein for proper gene expression. For eukaryotes, mRNAs are processed via a step called splicing, whereby non-coding sequences are removed. However, we do not

know all of the machinery or mechanisms that are involved in regulating splicing. Schizosaccharomyces pombe, or fission yeast is a useful and inexpensive model organism for splicing studies because of the similarity of splicing architecture to that of humans. To gain insight on these mechanisms, we make mutants that are involved in mRNA splicing. Using a temperature-sensitive mutant library, we have screened for mutants that may be involved in splicing and then wish to map where the mutations are within the genome using whole-genome sequencing. In our initial experiments, we found that our sequencing samples contained large amounts of mitochondrial DNA (mtDNA) that pollute the sample. Using a method called Depletion of Abundant Sequences by Hybridization (DASH) (Gu et al., 2016), we will target mtDNA in vitro using CRISPR/Cas9 to deplete unwanted sequences in our sample. We are using quantitative PCR to examine the efficiency of our DASH depletion.

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FATTY ACID PROFILE OF HUMAN MILK SAMPLES FROM THE PHILIPPINES

Probiotics in breast milk is a very recent field of research, as the existence of the human milk microbiome was discovered only about a decade ago. More than 200 different species have been described in human milk. The function of microbiota in breast milk may include the enhanced immune development of the infant, better nutrient metabolism and absorption, improved intestinal barrier function, and stimulation of the gut-brain axis, which reduces infants' risk of infectious diseases. The chemicals present in breast milk may be responsible for this biological activity. The objective of this study is to determine the fatty acids in breast milk sample obtained from the Philippines and to compare the results gathered using GC-FID and GC-MSD with reported literature. In this study, the fatty acid profile of some breast milk samples from the Philippines was determined using AOAC Official Method 2012.13. Results showed variation among fatty acids in different samples. This could be due to several factors that affect breast milk composition, such as maternal age, parity, duration of pregnancy, maternal diet, and daily breastfeeding rate.

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THE EFFECTS OF CACAO ON SPATIAL WORKING MEMORY IN RATS

The present study investigated the impact of Theobroma cacao (cacao), a psychostimulant, on spatial working memory, body weight, food intake, water intake, and anxiety in female and male Long-Evans rats. Each gender was divided into control and experimental groups. Animals were placed in individual cages equipped with a running wheel and food and water were provided ad-libitum. Each day, body weight, food intake, and water intake were measured. The study consisted of two phases: Phase I utilized 12 female rats and Phase II utilized 12 male rats. Each phase was subdivided into three periods: 1) habituation (days 1-7), 2) experimental (days 8-21), and 3) withdrawal (days 22-27). Control rats received a placebo in periods 1, 2, and 3, while experimental rats received a placebo in periods 1 and 3 and received a treatment of cacao during period 2. The effect of cacao on spatial working memory was assessed by utilizing the methodology of the Morris Water Maze (MWM). Rats were evaluated by performance in the MWM during week 1 and week 2 of the experimental period, as well as 2 days and 5 days into the withdrawal period. It was hypothesized that when compared to the control group, cacao-treated animals would exhibit significant positive effects on spatial working memory with few negative side effects. Results with male rats supported the hypothesis; whereas, results with female rats did not. Cacao did not significantly affect anxiety in either gender.

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CHROMATOGRAPHIC ANALYSIS OF BEE PROPOLIS FROM DISTINCT SECTIONS OF THE UNITED STATES OF AMERICA

Propolis, a complex organic mixture produced by honeybees from the buds and exudates of plants, is utilized as a safeguarding barrier against predators in various beehives. Similarly to its implementation in beehives, propolis can be used as a protective barrier in the human body because of its beneficial properties once introduced to the immune system. This includes being an antiviral, antibacterial, and antimicrobial agent that qualitatively and quantitively varies depending on the vegetation, bee species, and area of collection. In this study, several propolis samples were collected from distinct parts of the United States and analyzed using a chromatographic technique (gas chromatography- mass spectrometry or GC-MS). The results concluded that most samples have a different composition, specific to the location of the beehive. Some of the unique chemicals found are caffeine from cinnamyl

cinnamate from Alabama, 3-methoxycinnamic acid from California, cinnamoylglycine methylester from Michigan, phenol, 2, 4-dichloro-benzenesulfonate from Mississippi propolis, benzyl cinnamate from New York, 2-methoxy-4-vinylphenol from Ohio, and 1,2-benzenedicarboxylic acid, diisononyl ester from Washington.

Jada Rojas, Itati Abadie, Samantha Healy, Michelle Pei. Psychology Department, Ithaca College 953 Danby Rd Ithaca, NY 14850

FIRST GENERATION STUDENTS AND ACADEMIC ANXIETY

Increasing numbers of first generation students are attending college in the United States. Prior research has demonstrated that first generation students face unique challenges in college settings. One of the challenges first-gen students tend to face is increased levels of academic anxiety due to the lack of familial experience in this environment. They may also be under additional pressure from their family as role models for the younger generation. The current study used data from the Healthy Minds Study to explore the differences in anxiety levels for first-gen students, as well as the academic impact of that anxiety. The study also addressed the family support and academic anxiety between first-gen and continuing students. An analysis of 45,369 participants showed that first-gen students reported higher anxiety levels compared to continuing students. First-gen students also reported more negative academic impacts as a result of anxiety or stress including getting a lower grade in exams or projects, getting a lower grade in one or more courses, receiving an incomplete or dropping one or more courses, and having a disruption in research, practicum, thesis, or dissertation work. Like continuing students, first-gen students reporting greater levels of stress also reported lower familial support. The limitations of the current study are discussed and suggestions for future research are offered.

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EVOLUTIONARY ANALYSIS OF DROSOPHILA ANANASSAE TTLL4A AND WUN2 PSEUDOGENES

Drosophila ananassae is a newly sequenced species of Drosophila that is evolutionarily related to the common fruit fly Drosophila melanogaster. Unlike other Drosophila species, D. ananassae was found to have an enlarged genome, and by studying its genome as part of the Genomics Education Partnership, researchers are observing how genomes change over time. Notably, D. ananassae has shed light on the evolution of pseudogenes, which are genes that have been duplicated, rearranged, and mutated to the point where they are no longer functional [1]. These pseudogenes may give insight into why the genome of D. ananassae is longer than other Drosophila species and help understand how pseudogenes affect the gene expression of their functional counterparts [1]. The purpose of my research was to annotate the genes in contig 13, a portion of the D.ananassae genome, and determine the evolutionary relationship between two predicted pseudogenes, TTLL4A and wun2. The results showed that CG7139, CG7133, CG7130, and RpLP0 were genes in this region of the genome. CG7139 in D. ananassae was also found to have an extra exon compared to CG7139 in D. melanogaster. Furthermore, the results showed that the TTLL4A pseudogene was duplicated and inserted into the genome first approximately 7 million years ago followed by the wun2 pseudogene.

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CLOCKS AND CAFFEINE: HOW TIME OF DAY IMPACTS ANXIETY IN LONG EVANS RATS

Caffeine, a common stimulant consumed by many individuals each year, has been used in research to identify the link between caffeine and anxiety. The current experiment aimed to determine how chronic caffeine intake at a particular time of the day (at the onset of the light or dark cycle) affects anxiety. The experiment involved Phase 1 to determine the appropriate caffeine dose (12.5 mg/kg), and Phase 2 to conduct the comparison of caffeine given at different times of day. Female Long Evans rats were divided into two groups (light versus dark cycles) and given a milk treat in either a control or caffeinated form. Anxiety was measured once a week using an elevated plus maze (EPM) and by obtaining blood glucose levels post-sacrifice. The light cycle group demonstrated significant disruptions from the caffeine. Specifically, the

EPM results showed that a moderate dose of caffeine caused the light cycle experimental rats to be stimulated as evidenced by the rats spending more time in the open arms and less time in the closed arms in comparison to the control group. The experimental group also gained weight at a slower rate than the control group. However, glucose levels were found to be maintained among all groups in the light and dark cycles. These results could be important for shift workers because an appropriate dose of caffeine at a particular time of day may be beneficial for alertness without causing an increase in anxiety.

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PREDICTING PROTEIN-DRUG AFFINITY WITH TOPOLOGICAL DATA ANALYSIS AND DEEP LEARNING

The rapid development of new drugs is critical to public health, but the process of drug discovery is incredibly slow and expensive. Although computational models for drug discovery aim to alleviate this problem, it remains incredibly difficult to predict a compound's binding affinity from a three-dimensional structure. In this work, we explore the use of topological data analysis (TDA) in combination with deep learning to build predictive models of compound affinity from protein-ligand structures. Using the PDBBind dataset, structural data from protein-ligand complexes is transformed into an image-like feature set using persistent homology (a well-established technique in TDA). These images are then used to train a deep neural network to predict compound affinity. We explore hyperparameter choices as well as network architectures to assess the viability of this method. We also explore the featurization strategy using unsupervised learning techniques. Using feedforward neural networks to properly predict how well a protein will bind with medications and other drugs will prove to be paramount in a future where new viruses and diseases emerge without warning. Testing each new drug or medication with individual proteins manually takes a considerable amount of time. Using binding affinity data from the Protein Data Bank as training data for neural networks allows for determining any correlation between a protein's structure and its affinity towards certain bonds. Finding these correlations would allow for rapid predictions on an otherwise complex protein's ability to bind with medications resulting in a quicker production of necessary and effective medicine. This is done by rearranging the structural data of protein-ligand complexes using persistent homology to algorithmically create persistent images which are then fed into the neural networks as the training data. Work is currently being focused on optimizing the hyperparameters used in making the persistent

images, training the neural networks, and making the neural networks easier to tune with an algorithm being looked into that would automate the optimizing of the hyperparameters.

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CHARACTERIZATION OF MEDICAGO TRUNCATULA PLANT MUTANTS WITH DEFECTIVE SYMBIOTIC NITROGEN FIXATION AND SUPERNODULATION PHENOTYPES

Legume plants are unique because of their ability to form a symbiotic relationship with the soil bacteria rhizobia. Rhizobia infect legume plants and form structures called “nodules” on the roots. Inside the nodules, rhizobia capture and convert atmospheric nitrogen into usable form ammonia by a natural process called symbiotic nitrogen fixation (SNF). Understanding this process of SNF by finding all the essential genes will help us to transfer SNF process to non-legume plants, which would decrease cost and increase environmental safety of crop production. We are using a forward genetics method in the model legume plant Medicago truncatula. Using tobacco Tnt1 retrotransposon, thousands of M. truncatula mutants were created by the Noble Research Institute. By screening ~4000 mutants, Dr. Veerappan isolated more than 200 mutants that are defective in SNF. I will present data on the secondary confirmation and phenotypic characterization of two mutants with defective SNF and supernodulation phenotypes in comparison to the wild-type. Wild type plant phenotypes are green shoots, large, ovoid-shaped and reddish pink nodules whereas the mutants show strong nitrogen deficiency (reddish purple shoots) and small, round, white nodules (Nod+;Fix-). Each mutant studied contains approximately 20-100 mutations, and in order to determine which mutation causes the defects of SNF, I will analyze Tnt1 mutant database and design PCR primers to further the identification of the causative mutation.

Sarah Weiby, Niagara University, 5795 Lewiston Rd, Niagara University, 14109 Cassandra Marnocha, PhD., William Edwards, PhD. Biology Department, Niagara University

ISOLATION AND CHARACTERIZATION OF SYNECHOCOCCUS FROM FAYETTEVILLE GREEN LAKE

Cyanobacteria are involved in primary production via photosynthesis in various aquatic environments. Synechococcus is a cyanobacterium that is found in Fayetteville Green Lake (FGL) in Syracuse, NY. FGL is meromictic and euxinic, meaning it has distinct layers that do not mix and deeper layers lack oxygen and

contain sulfide. Synechococcus carry an SQR (sulfide:quinone oxidoreductase) gene that allows them to survive in the deeper layers of FGL. SQR allows for anoxygenic photosynthesis by using sulfide as an electron donor. We have isolated a strain of Synechococcus from Fayetteville Green Lake. We are characterizing the growth of our Synechococcus strain under oxygenic and euxinic conditions by comparing cell densities in culture over time and under varying concentrations of sulfide. This is a starting point for further characterization of the role SQR plays in growth in euxinic conditions and how it impacts the growth of Synechococcus.

Sarah Weiby, Mark Gallo, PhD. Niagara University, Lewiston, NY.
Long Term Effects of Plasmid Stability in E. coli in a Non-Selective Environment.

Plasmids have become an area of interest due to their ability to carry antibiotic resistance genes, resulting in more antibiotic resistant bacteria. Plasmids are small circular, DNA elements that can encode beneficial genes for their bacterial hosts. Little is known about how the energy costs of carrying a plasmid in a non-selective environment affect plasmid persistence. A plasmid that is widely used in teaching laboratories is pGLO™. This plasmid is frequently used because it encodes green fluorescent protein and is under control of an arabinose promoter, has a multiple cloning site, and encodes a β-lactamase enzyme for ampicillin resistance. In this study we looked at the rate of pGLO™ loss in several strains of E.coli. They were grown in various conditions where there was no selective pressure for antibiotic resistance maintenance. This study followed the long term preservation of intact pGLO™.

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The Fluorous Effect

Through physical modelling and simulation, the fluorous effect is compared to the hydrophobic effect in this project. The results of this simulation lend themselves to a unique comparison to fluorinated hydrocarbon molecules and proteins to assist in the understanding of these reactions. The analysis of the fluorous effect provides insight into how water molecules will react within protein structures, and how proteins would fold when fluorinated. This provides more understanding of how proteins fold, and how engineering proteins with synthetic fluorinated amino acids could take place.

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