Skidmore College

FACULTY STUDENT SUMMER RESEARCH PROGRAM

SUMMER 2017

FINAL PRESENTATIONS
AUGUST 3, 2017

Faculty Student Summer Research Program
Summer 2017

Index

Since 1989, Skidmore College's Faculty Student Summer Research Program has given students a singular opportunity to work one-on-one with a faculty member. For periods ranging from five to ten weeks, students work with faculty on original research in disciplines ranging from biology to management and business, including classics and geosciences. Hands on research with a faculty member allows students to become part of the research enterprise in a way that both complements and informs regular class work. In some cases, the collaborative research forms the basis for a major's honors thesis or can lead to published articles in a peer reviewed academic journal. Long-term mentoring relationships

Funding Sources for Faculty-Student Summer Research Programs

ALUMNI, FAMILY, AND FRIENDS

Harman Cain Family ‘12
Samuel Croll ‘73
Marlene Oberkotter Fowler ‘61
Christy Johnson ‘90
Jim Lippman and Linda Friedman Lippman ‘82
Richard A. Mellon ‘87
Rafael M. Nasser ‘88
Margaret Williams Page ‘43
Don and Jean Richards
The Riederer Family
Mr. and Mrs. Kenneth Woodcock, Parents ‘96
Axelrod-Porges Scholars
Established in 2006 by Felicia Axelrod ‘62 and Robert Porges to support faculty-student teams in the area of the sciences.
Schupf Scholars
Established in 2008 by Sara Lubin Schupf ‘62 to support summer faculty-student research with a preference given to students pursuing projects in the STEM disciplines. Schupf Scholars are selected beginning the summer after their freshman or sophomore year. Schupf Scholars may access additional funding for travel to meetings and conferences as well as for research supplies and expenses during their continuing research with faculty during their academic career at Skidmore.
Weg Scholars
Established in 2010 by Carol Little Weg ‘64 and Ken Weg and awarded with a preference for students pursuing projects in the sciences and social sciences.

FOUNDATIONS AND GRANTS

Mellon Foundation (NY6)
W.M. Keck Foundation
Rathmann Family Foundation
The Petrlik Family Foundation
American Chemical Society, Petroleum Research Foundation
Center for Aerosol Impacts on Climate and the Environment
Psychology Department
S3M Transitional Program
The National Science Foundation
National Institutes of Health, National Institute on Aging
U.S. Department of Homeland Security, FEMA

The Schupf Scholars Program

Each year the Schupf Scholars Program funds students to participate in the Student Faculty Summer Research Program and to continue that research with their faculty mentor in the ensuing academic year. The Schupf Scholars Program focuses on science, technology, and mathematics, and pays special attention to interdisciplinary projects and to female students in fields where women are underrepresented

EXPANDING THE GENETIC CODE WITH PYROGLUTAMATE
Hongwei Yu, 2019; Hannah Forman, 2019

DEVELOPMENT OF MICROFLUIDIC DEVICES FOR THE DETECTION OF IODIDE IN SURFACE WATER
Suzanne Zeff, 2020
Kimberley A. Frederick, Professor, Chemistry Department

ROOM B

NON-SPECIFIC EFFECTS OF OPTOGENETIC TRANSGENE EXPRESSION IN WAKE PROMOTING NEURONS OF ***DROSOPHILA MELANOGASTER***
Ryan Toma, 2018
Christopher Vecsey, Assistant Professor, Neuroscience Program

DOES SPINOCEREBALLAR ATAXIA TYPE 1 IN MICE ALTER CIRCADIAN CLOCK FUNCTION?
Sarah Wilensky, 2018; Brittany Newsome, 2019; Hannah Knaul, 2018; Ricardo Merlin, 2020; Christianel Gil, 2020
Bernard Possidente, Professor, Biology Department
Sarita Lagalwar, Assistant Professor, Neuroscience Program

SIMPLEX OPTIMIZATION OF COLOR INTENSITY OF SILVER NANOPARTICLE FILMS
Jessica Ranesizafiniaina Ndrianasy, 2020
Maryuri Roca, Teaching Professor, Chemistry Department

CONFORMATIONAL CHANGES OF ARKA12
Robyn Stix, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

ROLE OF SEGMENTS 1 AND 2 IN THE ARKA12 STRUCUTRAL ENSEMBLE
Gabriella Gerlach, 2019
K. Aurelia Ball, Assistant Professor, Chemistry Department

ROOM C

DAYTIME CHEMISTRY OF SEA SPRAY AEROSOL: ALTERNATIVE PATHWAY OF HONO FORMATION
Kathleen J. Maas, 2020; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

EFFECT OF CULLIN -5 PROTEIN ON CONFORMATIONAL FLEXIBILITY OF HIV-1 COMPLEX
Sampriti Thapa, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

INTERACTIVE EFFECTS OF LITHIUM AND ALCOHOL ON FRUIT FLY CIRCADIAN ACTIVITY RHYTHMS: TESTING A MODEL FOR DRUG INTERACTIONS IN BIPOLAR DISORDER
Hannah Knaul, 2018; Brittany Newsome, 2019; Sarah Wilensky, 2018; Sophia Moritz, 2018; Christianel Gil, 2010; Ricardo Merlin, 2020
Bernard Possidente, Professor, Biology Department

DOWNSTREAM CONSEQUENCES OF SELF-DISTANCING
Wallis Slater, 2018
Daniel Peterson, Assistant Professor, Psychology Department

DEVELOPMENT OF A PAPER MICROFLUIDIC TEST FOR D-LACTATE: A DIAGNOSTIC TEST FOR MALARIA
Roxanna Martinez, 2019; Kyla Johnson, 2020
Kimberley Frederick, Professor, Chemistry Department

PROJECT ABSTRACTS

Project:

SYNTHETIC INVESTIGATION INTO A CLASS OF HIGHLY SUBSTITUTED CYCLOHEXENE COMPOUNDS

Brian Wollocko, 2018
Kara Cetto Bales, Senior Instructor, Chemistry Department

Highly substituted cyclohexene compounds have a variety of applications ranging from pharmaceuticals to cosmetics and preservatives. Considering their range of functions, research into inexpensive and innovative synthesis methods for such compounds is of interest. Our group investigates the formation of highly substituted cyclohexene compounds using Lewis acid catalyzed Diels-Alder chemistry. We have recently synthesized one such compound which shows promise as an effective fungicide. This research investigates a similar class of highly substituted cyclohexene compounds with the aim of increasing solubility while maintaining fungicidal properties.

Project:

EFFECTS OF CONFORMATIONAL CHANGES AND FLEXIBILITY FROM ARKA BINDING TO ABP1-SH3 DOMAIN

Kristina Foley, 2018
K. Aurelia Ball, Associate Professor, Chemistry Department

SH3 domains are common protein interaction domains found across all forms of life, including over 400 domains in humans. These domains bind to intrinsically disordered proteins (IDPs), proteins that do not fold into a stable secondary structure. One SH3 domain in yeast, Abp1SH3, has a binding site for the ArkA IDP, but little is known about the binding process. Molecular

for ArkA, an IDP. Replica exchange molecular dynamics simulations with were used to model ArkA, and segments one and two of ArkA. It was found that while the entire ArkA peptide samples at least 6 conformations, segment 1 only samples one, where nearly all residues are in the conformation polyproline II. These conformations will be used to run simulations of ArkA binding to the Abp1 SH3 domain.

Project:

CONFORMATIONAL CHANGES OF ARKA12
Robyn Stix, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

SH3 domains are common protein interaction domains that are found across all forms of life and bind flexible intrinsically disordered proteins (IDPs). IDPs are difficult to model using only experimental methods. Molecular dynamics (MD) simulations mimicking experimental conditions were used to model the ArkA IDP which binds to the SH3 domain found in yeast, Abp1-SH3. ArkA IDPs are believed to bind to SH3 domains in a multi-step binding process. Conformational analysis was applied to the ArkA IDP to gain a better understanding of conformations that may promote this binding. ArkA was found to sample a higher population of polyproline II helices compared to experimental data, which is likely due to restriction of the omega bond of proline to the trans conformation in the MD simulations.

Project:

PART OF THE WHOLE: HOW STRUCTURAL CHANGES A FFECT DYNAMICS IN THE HIV -1 VIF COMPLEX
Elise Tierney, 2018; Lieza Chan, 2018
K. Aurelia Ball, Associate Professor, Chemistry Department

Intrinsically disordered proteins (IDPs) are not thought to influence the conformation of folded proteins because, inherently, IDPs lack a fixed secondary structure. The IDP Vif gains structure in complex with EloC, EloB, CBF- , and Cul5 (VCBC-Cul5). Vif uses the complex to degrade the antiviral APOBEC enzyme. The VCBC

Project:

EFFECT OF CULLIN -5 PROTEIN ON CONFORMATIONAL FLEXIBILITY OF HIV- 1 COMPLEX

Sampriti Thapa, 2018
K. Aurelia Ball, Assistant Professor, Chemistry Department

HIV-Vif protein is an intrinsically disordered protein (IDP) that gains stability when bound to Elongin-B (EloB), Elongin-C (EloC), CBF-β, and Cullin-5 (Cul5), forming the VCBC-Cul5 Complex. Cul5 is a scaffold protein that is directly involved in the ubiquitination and degradation of antiviral proteins. While the crystal structure of the VCBC-Cul5 Complex has been solved, the role of conformational flexibility of the complex without Cul5 is not known. To investigate the role of Cul5 on the conformations sampled, molecular dynamics (MD) simulations were run on VCBC. Using principle component and dihedral angle analysis, it was determined that VCBC is more flexible without Cul5 bound and the alternate states sampled by the VCBC complex may be important for function.

Project:

THE MILITARY AND POLITICAL IMPLICATIONS OF GENETIC WEAPONS

Brian Roberge, 2018
Yelena Biberman and Ocakli, Assistant Professor, Political Science Department

Our research project investigates the developments in the fields of genetics and synthetic biology. It draws on government records, cutting-edge multidisciplinary journals, classic works, and interviews with experts in the field. We begin by providing a comprehensive examination of the history of biological warfare, genetics, and biological engineering. We then analyze how the emerging technologies could influence the way state and nonstate actors will carry out organized violence in the near future. We find that genetic weapons will most likely be used for individual or small-group assassinations or long-term coercion. Their use will also have significant political implications for the alignment of social groupings and biological privacy. Our project concludes

their scope, functions, and outcomes. Syllabi for these courses ar

Project:

SINKING PARTICLE FLUX IN THE UPPER OCEAN

Laura Heinlein, 2019
Meg Estapa, Assistant Professor, Geosciences Department

Particles sinking from the surface ocean to the deep ocean are an important component of the biological carbon pump. This mechanism allows the ocean to sequester atmospheric CO_2 into deep sediments. One technique used to measure sinking particles in the upper ocean is sediment traps which collect passively settling particles. The aim of this study was a trap intercomparison to better understand the biases of trap designs frequently in use by oceanographic studies. Samples were analyzed for mass flux and biogenic silica flux. Biogenic silica is formed by certain types of plankton in the upper ocean, and increases the rate of sinking of organic matter by making particles

Project:

THE DEPOT THEATRE - 40 YEARS OF PROFESSIONAL THEATRE IN THE ADIRONDACKS - A DIGITAL ARCHIVE

Geoffrey Greene, 2018
David Howson, Teaching Professor & Arthur Zankel Executive Director of Arts Administration

The Depot Theatre is a small professional, non-profit theater located in Westport, NY. Local residents founded the theatre in 1979 as a means to save the Westport Train Depot (circa 1876) from demolition. In 2018, the Depot Theatre will be celebrating its 40th anniversary season and plans to have an exhibition of its history. This summer's archive project includes sorting and digitizing 40 years' worth of old photos, playbills and documents. Research included documenting the discovery of historical stories and themes revealed by the archives. Some emerging themes include: the effect of technological changes on theatre operations and the importance of audience development. The project culminates in the delivery of an organized and digitized archive for the organization to use in the future.

Project:

REHYDRATING EFFICACY OF MAPLE WATER AFTER EXERCISE-INDUCED DEHYDRATION

Alexs Matias, 2018; Monique Dudar, 2020; Josip Kauzlaric, 2020
Stephen J. Ives, Assistant Professor, Health and Exercise Science Department

Exercise in the heat results in profound dehydration, deleterious to physiology and performance. While increasing in popularity, no study has explored the rehydrating efficacy of maple water (MW). Twenty-six young healthy volunteers (n=13 males) participated in a single-blind, counterbalanced, crossover design study of the potential impact of MW on hydration, thirst, fatigue, and heart rate variability (HRV) after exercise-induced dehydration of ~2%. After attaining post-exercise measures, participants consumed 1L of MW or maple-flavored water and then monitored at 0.5,1, and 2hrs post-exercise. No significant differences in hydration, fatigue, or HRV were observed, though thirst remained higher with MW. Some of the markers of dehydration occurred in a sex-specific manner. In conclusion, MW does not appear to enhance rehydration, although sex differences in rehydration may exist.

one of which is encoded on a plasmid (pECL_A) which can be transferred to other bacteria. After the transfer of pECL_A into E. coli, no increase in copper resistance has been observed. This is presumably due to the presence of a transposon within one of the regulatory genes. The aim of this work was to clone the functional regulatory genes (pcoRS) contained within the 20 kb chromosomal gene cluster of Cloacae for expression in E. coli GR161(pECL_A) and observe the effect on the bacterium's ability to tolerate copper stress. The gene cluster pcoRS has been successfully cloned into pACYC177, and we are now working to transform it into E. coli GR161(pECL_A) to confer copper resistance.

Project:

COPPER RESISTANCE AS SURVIVAL STRATEGY OF BACTERIAL PATHOGENS

Xavier Cambi, 2020
Sylvia F. McDevitt, Associate Professor, Biology Department

Project:

BACKLASH AGAINST MEN WHO DEPRIORITIZE WORK
Alexandra Dennis, 2018
Corinne Moss

plasma was investigated in-situ in order to determine the conditions for an effective oxidation. Our results show a novel and effective method for the free-radical reaction with adsorbed volatile or semi-volatile compounds. Quantum mechanically calculated vibrational frequencies of the adsorbed oxidized products suggest the first oxidation of cyclohexane is the limiting step.

Project:

DAYTIME CHEMISTRY OF SEA SPRAY AEROSOL: ALTERNATIVE PATHWAY OF HONO FORMATION

Kathleen J. Maas, 2020; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry Department

Sea spray aerosols (SSA) are particles of varying size and composition released from bubble bursting on the ocean's surface, or marine boundary layer (MBL). SSA are known to contain complex organic chromophores known as humic-like substances (HULIS), which are naturally emitted from the MBL and/or formed though SSA atmospheric processing. HULIS are known photosensitizers that can open alternative photochemical pathways within SSA. In this study, we investigate the photosensitization of NO_2 and NO_3^- to produce HONO, an important source of hydroxyl radicals in the troposphere, and nitrogen oxides.

Project:

DAYTIME AND NIGHTTIME ATMOSPHERIC PROCESSING OF US FLY ASH

Yao Xiao, 2019; Deborah Kim, 2018
Juan G. Navea, Assistant Professor, Chemistry

Fly ash, a byproduct of coal firing, is an aerosol rich in iron oxides. Under acidic conditions, it can leach iron, an essential nutrient for living organisms in the ocean. In this study, we compare the iron mobility from fly ash in nitric acid to that in hydrochloric acid. In the presence of nitrates, we hypothesize that surface phenomena, combined with redox reactions from leached iron, will reduce nitrates into nitrites. In this project, the yield and rate of iron and nitrite leached from US fly ash has been investigated under both pH 1 conditions in both daytime and nighttime conditions.

Project:

DYNAMICS O7 ( )Tj EMC /N81 re h *481 re f wC /The aÍ#t8 0.48 0.48(DYNAM)2 ac9= Z°ï#ave39-36.9

suggestion that affirms their identities, and then asked the controversial questions, they become more open to engagement. Using this insight, we designed a self-affirmation manipulation. We also tested a prime using collective pride to soften the positions of those holding denialist positions. Our goal is to get a better understanding of what leads to genocide denial, and identify interventions that could help minimize such attitudes.

Project:

DOWNSTREAM CONSEQUENCES OF SELF-DISTANCING

Wallis Slater, 2018
Daniel Peterson, Assistant Professor, Psychology Department

Individuals routinely experience negative, upsetting events. A body of research has demonstrated that slight shifts in perspective when thinking about a distressing event, from immersed to a self-distanced perspective, are associated with decreased negative affect. Furthermore, research has demonstrated that self-distancing can have delayed benefits, such that individuals who engage in the self-distancing at time 1 also display lower levels of distress at time 2. However, these delayed benefits are seen when individuals reprocess the same event at both times. While this is an interesting finding, it is unlikely that individuals routinely experience the same negative events over and over again. Therefore, an important question has yet to be explored: how does self distancing at time 1 influence the subsequent processing of other negative events at time 2?

Project:

ANALYZING SOCIAL CIRCADIAN ACTIVITY RHYTHMS IN GROUPS OF 100 ***DROSOPHILA MELANOGASTER***

Sophia Moritz, 2018; Hannah Knoll, 2018; Brittany Newsome, 2019; Sarah Wilensky, 2018; Ryan Toma, 2018; Justin Jones, 2016; Abby Bryant, 2014; and Arianna Laszlo, 2014.
Bernie Possidente, Professor, Biology Department
Lucy Spardy, Assistant Professor, Math Department

Drosophila Melanogaster, otherwise known as the fruit fly, is a model organism for the study of genetics, development, and even circadian rhythms. Fruit flies are generally more active during the day with sporadic periods of sleep during the day and night. Over the course of three years, Skidmore students have recorded the patterns of activity and sleep for groups of 100 flies of several strains of Drosophila; these include Wild-Type Canton-S, and the circadian clock mutants period and timeless. While investigating these patterns, a phenomenon of sporadic “spikes” of hyperactivity was observed during the day. I developed numerical criteria for defining these

Project:

DRUG INTERACTINOS BETWEEN LITHIUM AND CAFFEINE: A MODEL FOR BIPOLAR DISORDER

Sarah Wilensky, 2018; Hannah Knaul, 2018; Brittany Newsome, 2019; Sophia Moritz, 2018
Bernard Possidente, Professor, Biology Department

Although coffee is widely considered to be an innocuous or even beneficial drink, it can have dangerous effects on bipolar disorder patients. Bipolar disorder is a mental illness characterized by alternating episodes of mania and depression. Bipolar patients who consume caffeine through coffee are 2.4 times more likely to commit suicide than if they had abstained from coffee, and the risk increases on a dose-dependent manner. We used fruit flies (Drosophila melanogaster) to determine whether caffeine interacts with lithium, which is commonly prescribed for bipolar disorder, to alter locomotor activity and circadian clock function. Flies were treated with control

Project:

MINING CODE IN SEARCH OF REASON
Giorgos Petkakis, 2018
David Read, Lecturer, Computer Science Department

The Web Ontology Language (OWL) is a semantic specification which defines formal logical constructs allowing web sites to find information and connect facts from computers on the Internet. Every day, companies like Google use OWL-based software to seamlessly combine maps, events, locations, venues, weather conditions, and more. Broader use of OWL is constrained by the lack of a freely available computer program implementing the complete specification. Our project's goal was to enhance Apache Jena, a free, albeit incomprehensive, software library for OWL. As our work began we found that Jena's design allows for powerful extensibility at the cost of significant complexity, requiring additional effort to understand. This presentation focuses on our work with OWL, Jena, and concepts involved with implementing computer software which supports reasoning.

Project:

OBESITY AND INSULIN RESISTENCE IN MICE
Luke Calzini, 2018; Ally Dalton, 2019
T.H. Reynolds, Professor, Health and Exercise Sciences Department

Researchers estimate that ~30% of the global population is obese. Literature suggests that age plays a role in the development of obesity and insulin resistance, particularly in females. This study examined the effect of age and sex on obesity and insulin resistance in C57Bl/6J mice. Additionally, the role of the tissue factor protease-activated receptor-2 (TF-PAR2) signaling pathway was investigated, as recent research has discovered a link between this pathway and obesity. Our study demonstrates that aged female mice are significantly more obese and insulin resistant than their younger cohort. Furthermore, we discovered that female mice do not develop obesity with advancing age. Finally, the TF-PAR2 signaling pathway doesn't appear to influence the development of obesity and insulin resistance.

Project:

SIMPLEX OPTIMIZATION OF COLOR INTENSITY OF SILVER NANOPARTICLE FILMS
Jessica Ranesizafiniaina Ndrianasy, 2020
Maryuri Roca, Teaching Professor, Chemistry Department

Silver nanoparticle films of various colors were prepared as a step forward in the field of nanotechnology. To prepare these films, silver was reduced using sodium borohydride and ascorbic acid, and the resulting nanoparticles were embedded in polymer. The color of the film depends on the

pr

Project:

EXPANDING THE GENETIC CODE WITH PYROGLUTAMATE

Hongwei Yu, 2019; Hannah Forman, 2019
Kelly Sheppard, Associate Professor, Chemistry Department

Non-canonical pyroglutamate incorporation during protein synthesis will aid the study of medical conditions like Alzheimer's disease. To better understand pyroglutamate's role in protein structure and function, an E. coli model system was developed to directly incorporate pyroglutamate into proteins. Key to this process is the use of a modified archaeal-derived, tRNA dependent glutamine biosynthetic pathway in which pyroglutamate is synthesized on an amber suppressor tRNA. Enhanced yellow fluorescent protein was used as a reporter system to determine levels of read through, and therefore incorporation, of pyroglutamate in response to an amber codon. In order to determine presence of eYFP, fluorimetey was used. As yield was poor, we are developing a new pyroglutamate system using mesophilic enzymes. Success of this system will be confirmed by mass spectrometry.

Project:

DIRECT PATHWAY FOR ***BACILLUS ANTHRACIS*** tRNA ASPARAGINYLATION

Jose Giron, 2020
Kelly Sheppard, Associate Professor, Chemistry Department

Protein synthesis is essential for life and requires the correct pairing of amino acids to their transfer tRNA (aminoacylation). To date, only two routes exist to attach asparagine (Asn) to its cognate $tRNA^{Asn}$: the direct and the indirect pathways. The direct path uses asparaginyl-tRNA

Project:

MONITORING THE E UTROPHICATION OF LAKE LONELY AND TRIBUTARIES THROUGH SEASONAL NUTRIENT CYCLES
Devon McLane, 2019
Kurt Smemo, Assistant Professor, Environmental Studies and Sciences Program

Growing seasonal nutrient cycle data from the Lake Lonely tributaries (Spring Run, Beaver Meadow Brook, and Bear Swamp) provides an understanding to the current health of Lake Lonely and the cultural eutrophication process currently affecting the lake. Ion chromatography and various colorimetric techniques are used to determine the total nitrogen, total phosphorus, and chloride concentrations of each tributary and the lake. Analyzing past and current data provides observations of these levels changing over time and the effects of human impact.

Project:

ANALYZING OSCILLATOR DYNAMICS FOR GROUP BEHAVIOR IN ***DROSOPHILA MELANOGASTER***
Alexandra Cassell, 2019; Alexander Smith, 2018
Lucy Spardy, Assistant Professor, Mathematics Department

The wild-type *Drosophila melanogaster*, the common fruit fly, has an intrinsic 24-hour circadian rhythm with peaks of activity near dawn and dusk. Bernard Possidente's biology research has demonstrated that in large groups, fruit flies exhibit similar patterns of activity around dawn and dusk but has also shown a presence of random activity spikes during the light period. Our goal is to develop a mathematical model to explain and predict the population dynamics. We use the phase and Van der Pol oscillators to represent a morning and an evening oscillator as two components of the circadian rhythm. We entrain the morning to dawn and the evening to dusk and couple them to other flies. Future research will address the inclusion of the random daytime activity.

Project:

PILOTING A REGIONAL NETWORK FOR YOUTH RADIO PARTICIPATION
Adam Simon, 2019

In addition to our qualitative study of youth interactions with radio, we also asked: How might we design a program that meaningfully engages with the larger community in which Skidmore exists; What would a regional network of youth radio look like? In our experiments, forging community partnerships and decentralizing our broadcasting infrastructure laid groundwork for potential future expansion of this project.

Project:

THE CLOUD PROJECT
Emily Moreton, 2018

Project:

NON-SPECIFIC EFFECTS OF OPTOGENETIC TRANSGENE EXPRESSION IN WAKE PROMOTING NEURONS OF ***DROSOPHILA MELANOGASTER***

Ryan Toma, 2018
Christopher Vecsey, Assistant Professor, Neuroscience Program

Pigment dispersing factor (PDF) neurons in the fruit fly, Drosophila, have important roles in circadian rhythm synchronization and wake promotion. Herein we created a transgenic fly which expresses a light activated ion channel (Chrimson) in PDF neurons. Based on previous preliminary findings, we hypothesized that the activation of PDF neurons by activating Chrimson would result in a desynchronization and shortening of circadian rhythms. To corroborate past findings, we ran a control experiment with no light stimulation to assess the circadian rhythms of flies without Chrimson activation. To our surprise, we observed dramatically impaired rhythmicity in transgenic flies, with an associated rhythm shortening. Our results indicate that the expression of Chrimson into PDF neurons has detrimental effects on circadian rhythmicity regardless of direct Chrimson activation.

Project:

WORD BLAST! AN EXAMINATION OF YOUNG CHILDREN'S SEMANTIC DEVELOPMENT

Ramon Diah, 2018; Zoe Chodak, 2019
Erica Wojcik, Assistant Professor, Psychology Department

Our summer research investigated how the structure of young children's word knowledge changes from age three to seven and whether genders differences exist. Adults tie together words from the same category (e.g., morning-night). We hypothesized that this organization develops slowly over childhood. Participants (32 children aged 3-8 and 21 adults) played a game in which they heard a list of words and responded with the first word that came to mind. There was only a significant main effect of age: there were more category-match responses for adults than for children, $F(2, 47) = 14.13$, $p < 0.001$, and the data suggest that this changes across early childhood. We plan to continue to collect data and create a public database of child associations for other researchers to explore.