Online Proceedings

SESSION 1D

MEDICAL THERAPEUTICS AND ENDOCRINOLOGY

Session Moderator: Ian Sweet, Medicine
231 MGH
1:15 PM to 2:45 PM

* Note: Titles in order of presentation.

Divergent Effects of High- and Low-Molecular Weight Hyaluronan on Glucose-Stimulated Insulin Release from Rat Islets

Len Tran, Senior, Biology (Physiology), Neurobiology
Mary Gates Scholar
Mentor: Rebecca Hull, Medicine
Mentor: Michael Peters, Metabolism, Seattle Institute for Biomedical and Clinical Research

The pancreatic islet β-cell maintains blood glucose homeostasis by releasing insulin, a process that becomes dysfunctional in type 2 diabetes mellitus. Thus, maintaining normal β-cell function is critically important and occurs through many mechanisms including interactions with the surrounding extracellular matrix (ECM). We have recently shown that the polysaccharide hyaluronan is a normal component of the islet ECM. Under normal conditions, hyaluronan exists in a high molecular weight (HMW) form ($>$500 kDa) which exerts anti-inflammatory effects on surrounding cells. One study has shown that HMW hyaluronan can potentiate β-cell glucose-stimulated insulin release (GSIS). Our preliminary data suggest, in diabetic islets, hyaluronan can become fragmented. Low molecular weight (LMW) hyaluronan ($<$10 kDa) is pro-inflammatory. Furthermore, agents that can activate the same intracellular signaling pathways as LMW hyaluronan (e.g. free fatty acids and lipopolysaccharide) have been shown to impair GSIS, suggesting LMW hyaluronan may have a similar effect. I hypothesize that HMW hyaluronan potentiates GSIS, whereas LMW hyaluronan inhibits GSIS in vitro. Rat pancreatic islet cells were cultured on plates coated with HMW hyaluronan, LMW hyaluronan, or L-ornithine (control). After 48 hours GSIS was determined by comparing insulin release under basal (low glucose) and stimulated (high glucose) conditions. Our preliminary data show that as expected HMW hyaluronan potentiates GSIS 2 fold while LMW hyaluronan decreases GSIS by 30% compared to control. Thus it appears HMW hyaluronan is beneficial for β-cell function whereas LMW hyaluronan lacks this effect. Hence, hyaluronan fragmentation in the islet under diabetic conditions may contribute to impaired β-cell function.

POSTER SESSION 2

MGH 241, Easel 167
12:45 PM to 2:15 PM

Modeling the Evolution of Multicellularity

Joseph Henry (Joe) Marcus, Senior, Biology (General)
Mary Gates Scholar
Samuel Evans (Sam) Reed, Senior, Biology (Ecology, Evolution & Conservation)
Mary Gates Scholar
Mentor: Benjamin Kerr, Biology
Mentor: Peter Conlin, Biology

The evolution of multicellularity is one of the most important yet least understood biological phenomena. What selective pressures drive this major evolutionary transition? To address this question, we use a theoretical approach to model the spatial properties of cell groups in a simulation entitled Tree-Multicellularity (TreeMu). In TreeMu a simple multicellular organism is represented as a graph, with nodes representing cells, and edges representing physical connections between cells. Like cells, nodes carry intrinsic attributes, such as reproduction, mutation and death rates; these dictate life processes and define an individual's fitness. Like multicellular groups, graphs have similar properties that emerge from individual contributions. When a node dies it splits the graph in two, analogous to group level reproduction. We explore how the evolution of a node's death rate affects multicellular growth. In the simulation we implement an evolutionary algorithm that selects for 'multicellular' graphs of large sizes by removing small groups from the population. Preliminary data supports a tradeoff between group size and reproduction. TreeMu provides a computational framework to explore the dynamics of multicellular evolution.

POSTER SESSION 2

MGH 241, Easel 149
12:45 PM to 2:15 PM

Uncertainty in Ranking the Hottest Years of U.S. Surface Temperatures
Tae Yen (Amy) Kim, Senior, Statistics, Economics
Mentor: Peter Guttorp, Statistics

People have often heard statements like "2010 is the hottest year on record in the world." However, this ranking in order of average global temperature is uncertain, because the global temperature is not a direct measurement but a statistical combination of data, which by itself has uncertainty. We have developed new methods to rank each year taking into account the standard error of a real mean temperature. The methods give us distributions of the rank of each year's temperature, and allows us to compute the probability that a given year is the hottest year on record. We can arrange the years in order of these probabilities. The results are consistent with regular ranking of continental US annual mean temperature, but allows us to express the uncertainty of the ranks. We can also estimate, for example, the probability that 12 of the last 15 years have been among the hottest ever, as President Obama said in his State of the Union address in February.

POSTER SESSION 2

MGH 241, Easel 141
12:45 PM to 2:15 PM

Synthesis of Palladium Nanowhiskers
Garrett Lincoln (Garrett) Bowen, Senior, Mat Sci & Engr: Nanosci & Moleculr Engr
Mentor: Peter Pauzauskie
Mentor: Zach Rousslang

Palladium is a part of the Platinum Group Metals (PGM), and is highly used as a catalyst in many applications such as in an automobile's catalytic converter. It has also been successfully used for hydrogen gas sensing devices. Employing low-cost, efficient means to synthesize palladium nanowhiskers in the lab has been the focus of my research thus far. Hydrothermal synthesis and dislocation mechanisms have been used for the growth of palladium nanowhiskers using a palladium (II) chloride charge. The hydrothermal synthesis involved chemical reactions as well as thermal reactions in the growth of the nanowhiskers. In the dislocation mechanism, the growth of the whiskers is the result of the thermal decomposition of palladium chloride to palladium plus chlorine gas. Scanning electron micrographs from the first four runs of the hydrothermal synthesis showed little to no nanowhiskers. The first run of the dislocation mechanism grown samples is currently awaiting characterization. Future work for my research involves many more dislocation mechanism growths of the palladium nanowhiskers, as well as an attempt to use electrochemical deposition as a third technique in producing these whiskers. The application of these nanowhiskers in hydrogen gas sensing is based on the change in the conductance of the whiskers upon absorption of hydrogen. This allows for highly sensitive sensors to be made.

POSTER SESSION 2

Balcony, Easel 116
12:45 PM to 2:15 PM

Dye-Sensitized Solar Cells Utilizing Porphyrin Dyes
Daniel (Dan) Polking Jr, Senior, Chemistry, The Evergreen State College
Tristan Workman, Senior, Biology, The Evergreen State College
Mentor: Peter Pessiki, Chemistry, The Evergreen State College

Alternative energy sources have been becoming a greater necessity as fossil fuels become higher in demand and pollution endangers the world. Dye-sensitized solar cells have been of increasing interest in the last twenty years as a possible low-cost and efficient alternative to conventional fuel sources. Porphyrins are synthetic analogs of chlorophyll, the molecule responsible for molecular oxygen. Our group has synthesized a number of porphyrins and constructed solar cells using these compounds as the light harvesting pigments necessary to produce energy. Our goal is to determine the change in energy gathering potential and binding capability of the porphyrins to the cells based on the substituent groups bound to the parent molecule. These results will be presented as well as our progress toward optimizing a working dye-sensitized solar cell.

POSTER SESSION 2

Balcony, Easel 86
12:45 PM to 2:15 PM

Hydrothermal Synthesis of Hydroxyapatite
Charles Hong (Charles) Yuen, Senior, Mat Sci & Engr: Nanosci & Moleculr Engr
Mentor: Peter Pauzauskie

Nanoscience and nanotechnology has evolved rapidly in recent decades. It promises a greater understanding and higher degree of customization in future materials. One field of interest is the ability to mimic the biological composition of bone tissue using nanoscale hydroxyapatite (HA). With the ability to manufacture and impregnate with proteins, the mimicked tissue can be utilized in vivo without the side effects of traditional organ transplants and biocompatible materials. HA nanowires were fabricated using a hydrothermal synthesis process. First, the precursor composed of calcium phosphate was synthesized via a sol-gel process to create a powder. After suspending the powder in solution of DI water and ammonium hydroxide, the solution was loaded into an autoclave and heated at 170 degrees Celsius for various

time periods. The product was then characterized using optical microscopy, scanning electron microscope (SEM) X-ray diffraction (XRD), and Raman spectroscopy. First, SEM was used to determine if particles were successfully synthesized. Next, the size of the nanowires was characterized. It was found that the nanowires had an aspect ratio of 5:1. XRD powder diffraction showed that the samples matched the industry standard peaks for HA. Lastly, Raman spectroscopy was conducted but the results are yet to be analyzed. The work has successfully synthesized nanowires of hydroxyapatite utilizing a hydrothermal process. Through use of the above characterization methods, we find that an alteration to the synthesis must be performed to obtain HA nanowires with larger aspect ratios. – 20:1. Successive syntheses are being conducted by varying pH levels and time periods to achieve the desired lengths.

SESSION 2R

EVOLVING SYSTEMS IN BIOLOGY: FROM MOLECULES TO MARSUPIALS

Session Moderator: Billie J. Swalla, Biology

022 JHN

3:45 PM to 5:15 PM

* Note: Titles in order of presentation.

Experimental Evolution of Phenotypic Plasticity

Samuel Evans (Sam) Reed, Senior, Biology (Ecology, Evolution & Conservation)
Mary Gates Scholar
Joseph Henry (Joe) Marcus, Senior, Biology (General)
Mary Gates Scholar
Mentor: Benjamin Kerr, Biology
Mentor: Peter Conlin, Biology

Darwinian natural selection produces an organism that is adapted to its environment, an organism whose traits (phenotype) are tuned in critical ways to its habitat. If organisms and their phenotypes are so finely tuned to their environment, how can they deal with changes to that environment? One strategy is to evolve the ability to change phenotype in response to a change in the environment, or phenotypic plasticity. Theory predicts phenotypic plasticity to be adaptive when (1) organisms experience different environments either spatially or temporally and (2) different environments favor different phenotypes. In some cases, changes may be accompanied by cues that provide reliable information about future selection. Previous studies modeling adaptive plasticity suggest plasticity to be favored when the environmental cue always predicts the correct selection and not when the environmental cue is unreliable. We experimentally tested theoretical predictions about the de novo evolution of adaptive phenotypic plasticity with a clustering phenotype of baker's yeast by selecting alternately for large or small clusters. Selection for size was cued by alternate forms of growth media and this cue was either a reliable predictor of future selection or an unreliable predictor. After a preliminary run of the experiment, we have found indications of an emergent plastic response in one of our replicates from the reliable cue treatment. This provides a biological example that is consistent with accepted theoretical predictions.

SESSION 2S

ASTRONOMY AND PHYSICS

Session Moderator: Suzanne Hawley, Astronomy

026 JHN

3:45 PM to 5:15 PM

* Note: Titles in order of presentation.

Satellite Galaxies as Dynamical Tracers for NGC 2841

Denise Marie (Denise) Schmitz, Senior, Mathematics (Comprehensive), Physics: Comprehensive Physics, Astronomy
Mary Gates Scholar
Mentor: Peter Yoachim, Astronomy

Research on galaxy dynamics indicates that visible matter cannot account for all of a galaxy's mass; the prevailing theory is that each galaxy is surrounded by a halo of dark matter. Dark matter can be studied by observing its gravitational influence on luminous matter, a technique known as dynamical tracing. We measure the orbital velocities of dwarf satellite galaxies as dynamical tracers for a central galaxy. Using data from the Sloan Digital Sky Survey (SDSS) DR8 and HyperLeda databases we have identified massive, isolated galaxies as potential targets and selected NGC 2841, a nearby large spiral galaxy. We also used SDSS to identify potential satellite galaxies and prioritize them for observation. Using the DIS spectrograph on the Apache Point Observatory 3.5m telescope, we have performed optical spectrosopy on a number of satellites to determine their line-of-sight velocities. We will use these results and a Jeans equation approximation to infer the mass of NGC 2841, and by comparing this value to the amount of visible mass, we will estimate the mass of its dark matter halo.

POSTER SESSION 3

Commons East, Easel 59

2:30 PM to 4:00 PM

Computer Assistance and Robotic Guidance in Percutaneous Scaphoid Fixation

Ian Taylor (Ian) Donaldson, Senior, Bioengineering
Mary Gates Scholar
Mentor: Peter Cavanagh, Orthopaedics, Sports Medicine

Scaphoid fractures are a common wrist injury. Percutaneous fixation with cannulated compression screws is the most frequently used method for the repair of non-displaced transverse scaphoid fractures. In this operation, surgeons manually drill K-wires into the central axis of the bone with visual guidance from fluoroscopic imaging; compression screws are then placed over the wire and drilled into the bone for stabilization. Major complications in this procedure resulting from inaccurate K-wire placements are common. The surgical platform that our group is developing will couple pre-operative CT imaging with an intra-operative vision system and robotic arm to improve accuracy in scaphoid fixations by directing K-wires to optimized surface entry points and trajectories. Briefly, pre-operative CT imaging data will be used to calculate an optimized entry point and trajectory for K-wire drilling into a scaphoid. This information will then be converted to the surgical field reference frame through a series of matrix operations, and the robot will move to a correct alignment based on this data. Vision system integration allows the robot to move dynamically with the hand during the operation (if necessary) and maintain the correct entry point and trajectory at all times. Thus far in the project, we have developed a LabVIEW VI that allows a robotic arm and drill guide to move dynamically in space with a splint-mounted vision system probe. We have also created MATLAB algorithms for scaphoid data processing. These algorithms first use a nonlinear constrained optimization scheme to calculate an ideal entry point and trajectory for K-wire drilling into the scaphoid; next, this data is registered in the surgical field reference frame. Taken together, this control software drives a fully integrated system from CT processing to compression screw placement in order to achieve scaphoid fixation. Current work focuses on testing the system in cadaver scaphoid fixation trials.

POSTER SESSION 3

Balcony, Easel 113

2:30 PM to 4:00 PM

Effects of Topography on Erosional Capacity of Pyroclastic Density Currents: A Case Study from Mt. St. Helens

Richard Charles Schwartz, Senior, Environmental Science, UW Tacoma
Chad Michael Sharp, Senior, Environmental Science, UW Tacoma
Mentor: Brittany Brand, Geosciences, Boise State University
Mentor: Peter Selkin, School of Interdisciplinary Arts & Sciences

Pyroclastic density currents (PDCs) are ground-hugging currents of hot gas and particles that travel at velocities up to 300 m/s. Because of the inherent danger of observing PDCs in real time, we rely on the deposits for insight into the dynamics of these dangerous currents. Our research uses the well-exposed PDC deposits from the May 18, 1980 eruption of Mt St Helens (WA) to explore how PDCs are influenced by surface roughness. The PDCs produced during the eruption flowed through areas of low and high surface roughness. We mapped and sampled deposits from a single PDC proximal, medial, and distal distances from the source, focusing on changes with distance from source and a comparison between deposits in areas of low and high surface roughness. In general the PDC deposits display poor-sorting and are massive in nature, suggesting deposition from a concentrated current with rapid sedimentation. Grain size and componentry data of deposits downstream from preexisting debris avalanche hummock, which provided high surface roughness, contain a threefold-increase in hummock components relative to PDC deposits in areas of low surface roughness. This suggests that high surface roughness promotes the erosive capacity of PDCs. The main driving force for PDCs is their great density relative to the air, thus increasing the density at the base of the current through substrate erosion could potentially increase the run-out distance, thereby increasing the destructive radius. The results from this research substantiate previous research that erosion by PDCs is a common occurrence, but also demonstrate that surface roughness is a primary contributor to the potential for erosion. Future work should explore the consequences of erosion on downstream dynamics. This will impact the ability of hazard mapping models to more accurately determine areas that are at risk for PDC interaction in the vicinity of volcanoes throughout the world.

POSTER SESSION 3

Balcony, Easel 115

2:30 PM to 4:00 PM

Understanding Frequency Content of Underwater Noise

Andre Stone, Sophomore, Mechanical Engineering
Mary Gates Scholar, NASA Space Grant Scholar
Mentor: Peter Dahl
Mentor: David Dall'Osto

With efforts being made to remove human impact on the ecosystems surrounding us, underwater ambient noise is a topic of interest. Understanding and even mitigating this ambient noise has come to be of foremost importance in various fields. To understand underwater noise, it is best to first have a well-developed understanding of noise in general and what it is about noise that we should concern ourselves with. Starting first with sources of sound, such as that of a person singing, can provide an introduction into how to process sound measurements underwater. By working with recordings in ".wav" form I was able to convert to a spectrum, or spread of frequencies, that can be read in terms of the frequency and underwater pressure, two important aspects when studying underwater ambient noise. Using a numerical com-

putation language (GNU Octave) to analyze sound data, I was then able to see plots of these spectra as well as to generate Pressure Spectral Density plots. I was then provided guidance regarding how to interpret these plots and apply this knowledge to various locations, a necessary introductory step in the overall process. Understanding ambient noise in general, as I was able to start doing this summer, and then taking it further to understand ambient noise in our area, is the first step towards curbing disturbances to our marine ecosystems.

POSTER SESSION 3

Commons East, Easel 49

2:30 PM to 4:00 PM

The Human NLRC4 Inflammasome and Immune Defense against *Pseudomonas aeruginosa*

Kelsey Christine (Kelsey) Nebeck, Non-Matriculated,
Mentor: William Berrington, Medicine
Mentor: Thomas Hawn, Medicine
Mentor: Glenna Peterson

Pseudomonas aeruginosa (*P. aeruginosa*) is a ubiquitous species of pathogenic bacteria and a major cause of hospital-acquired pneumonia. Immune responses to *P. aeruginosa* infection in mice are mediated by a cytosolic multiprotein complex called the NLRC4 inflammasome. The NLRC4 inflammasome assembles upon ligand recognition leading to the release of the pro-inflammatory cytokine interleukin (IL)-1β and culminating in cell death. *P. aeruginosa* elicits a flagellin-dependent release of IL-1β and cell death in mouse macrophages, but research has not found human macrophages to recognize flagellin. This immune response is evoked in human macrophages by needle protein, an element of the type three secretion system (T3SS) infection apparatus used by *P. aeruginosa*. The mechanisms human macrophages use to regulate immune response to *P. aeruginosa* have not been fully established. We hypothesize that NLRC4 regulates immune response to *P. aeruginosa* in humans and therefore, NLRC4 deficient macrophages infected with *P. aeruginosa* will have impaired cell death and IL-1β production compared to normal NLRC4 expressing cells. Small interfering RNA (siRNA) will be used to knock down mRNA and protein expression of NLRC4. Macrophages treated with non-specific siRNA and NLRC4 targeted siRNA will be infected with live *P. aeruginosa*. We will then assay for IL-1β with ELISA and cell death using a lactate dehydrogenase (LDH) release assay. We expect NLRC4 knockdown cells to release less IL-1β and LDH compared to cells treated with non-specific siRNA thus indicating that in humans, the NLRC4 inflammasome is associated with defense against *P. aeruginosa* infection. Upon establishing the function of human NLRC4 during *P. aeruginosa* infection, we will proceed to investigate the roles of NLRC4 inflammasome subunits in ligand recognition and initiation of an immune response. Defining these roles could further our understanding of mechanisms behind immunity or susceptibility to *P. aeruginosa* and potentially lead to novel treatments for infection.

POSTER SESSION 4

Commons West, Easel 9

4:15 PM to 5:45 PM

The Menkaure Valley Temple and 100 Years of Archaeological Practice

Alexandra Hope (Alex) Jacobsen, Senior, Anthropology
Mentor: Peter Lape, Anthropology

Using the lens of contemporary Egyptian archaeology, this research examines how the roles of Egyptian archaeology and archaeologists have changed since George Reisner first excavated the Menkaure Valley Temple over a hundred years ago in 1910. By examining the changes in archaeological practices, and the profession of archaeology in Egypt, this study seeks to explore a new perspective on how the application of archaeology has changed within the last century. There are many different ways of excavation, and methodologies have advanced dramatically over the past century. By comparing and contrasting old archaeological practices used by George Reisner in 1910 while excavating the Menkarure Valley Temple, Ancient Egypt Research Associates (AERA) is re-excavating the same structure and using Reisner's old work combined with new archaeological practices to develop a new understanding of the temple and its many modifications, and changes of use throughout the history of Ancient Egypt. By using myself as an archaeologist and Reisner's work along with the research conducted by the AERA team members as the investigative perspective, I will present a story that is relatively unknown, as well as introduce a new perspective on how the methods and practice of archaeology in Egypt have evolved. The project has the following steps:1. Compare Reisner's methods of excavation strategy, artifact analysis, dating (etc.—focus on methods) to 21st century AERA methods. 2. Discuss how contemporary archaeologists in AERA use old data collected by Reisner—problems, challenges, and solutions 3. How does all of this change the way we interpret the Menkarure Valley Temple?

POSTER SESSION 4

Commons East, Easel 44

4:15 PM to 5:45 PM

Low Drug Concentrations Prime Bacteria for High Levels of Antibiotic Resistance

Caroline Elizabeth (Carrie) Miller, Senior, Biology (General)
Mentor: Benjamin Kerr, Biology
Mentor: Peter Conlin, Biology

It is well documented that low levels of antibiotics are present in both surface water sources and in soil near industrial, large-scale farms. However, very little work has been done exploring the selective pressure for the evolution of resistance at these sub-inhibitory antibiotic concentrations. It is our concern that mutations acquired in a low antibiotic environment may be "potentiating:" that is, the presence of these first mutations opens more mutational paths after a shift to a high antibiotic environment. The converse may also be true in terms of "dooming" mutations that close off evolutionary paths in the new environment. Here we aim to investigate the prevalence of potentiating and dooming mutations and to understand their role in adaptive evolution. We study these phenomena by performing evolution experiments with *Escherichia coli* grown in a permissive environment (low drug concentration) followed later by a sudden shift to a new environment that imposes a strong selective pressure (high drug concentration). Here the permissive environment serves to generate mutational diversity and the harsh selective environment serves to assess the evolutionary potential of mutant isolates relative to their wild type ancestor. This will increase our knowledge of the evolution of antibiotic resistance and as well as the unintended but potentially dangerous effects of long term selection in the presence of low levels of antibiotics.

POSTER SESSION 4

Balcony, Easel 93

4:15 PM to 5:45 PM

Determination of Clay Fraction Minerals from the Vera Member (Sarmiento Formation) in Patagonia Argentina

James H. (James) Moore, Senior, Environmental Science, UW Tacoma
Mentor: Peter Selkin, School of Interdisciplinary Arts & Sciences

The Vera Member of the Sarmiento Formation in Southern Argentina contains the only continuous fossil record across the Eocene-Oligocene Transition (EOT) in the Southern Hemisphere. Marine records indicate that the EOT was a time of dramatic climate change; plant fossils also suggest cooler environments with a transition from subtropical to temperate forests at middle latitudes during this interval. Phytoliths from the Vera Member, however, indicate a wetter climate and relatively stable plant communities, and oxygen isotope data from tooth enamel also suggests minimal climate change across the EOT. The goal of this research project is to use clay mineralogy to examine the environment and local climate conditions in which the Vera Member was deposited, giving a context for plant and animal evolution. Common clay minerals such as montmorillonite, illite, chlorite, kaolinite, as well as cristobalite and tridymite were found to at least partially explain the x-ray diffraction (XRD) patterns produced from the Vera Member $<2\mu$m fraction. Kaolinite in particular is often formed within a much more humid environment than what conditions are currently present in Southern Argentina. If present, kaolinite would indicate that the climate may have been more humid during the EOT. Although the various clay mineral XRD data were a good match, it is difficult to ascertain exact mineral matches with the patterns that were produced. The results of this research project are inconclusive about the various climate proxies, but suggest that more detailed clay work could lead to a clearer understanding of the Vera Member and its unique geological timeline.

POSTER SESSION 4

Commons West, Easel 16

4:15 PM to 5:45 PM

Eyewitness Accuracy: Immediate Event Recall

Kidst Messelu, Senior,
Terra Lovelace

Mentor: Peter Collins, Criminal Justice Department, Seattle University

Past research has shown that figures of authority, media representation, emotionality, and perceived outcome of an event can all play a role in confounding eyewitness recall. The current research tested the effects of post event information and encouraging/leading statements on eyewitness event recall. Participants watched a short video clip, after which they filled out a questionnaire to assess their recall of the event. Results confirmed that leading questions and post event information confound eyewitness recall. These results have implications for both the ethical use of eyewitness questioning methods and the validity of using eyewitness testimony in the courtroom.

POSTER SESSION 4

Balcony, Easel 102

4:15 PM to 5:45 PM

Determining Star Formation in Red Spiral Galaxies

Meagan Briana Joyce (Meagan) Albright, Senior, Astronomy, Physics
Mentor: Peter Yoachim, Astronomy

Through the Galaxy Zoo Project, a project that lets public volunteers classify galaxies taken by numerous telescopes, several spiral galaxies were found that appear to be red in color in the visible wavelengths. Typically, only elliptical galaxies are red, so finding spiral galaxies of this color is an oddity. Initial analysis and explanations of these objects claimed that this group of galaxies has no star formation. However, these galaxies seem to be emitting massive amounts of light in the ultraviolet (UV), which might indicate that star forma-

tion is actually occurring. For this project, we compared the radial fits of these objects in the optical and ultraviolet using data from GALEX (Galaxy Evolution Explorer) and the SDSS (Sloan Digital Sky Survey) to see if these objects are just regular high mass spirals or galaxies nearing the end of their star formation that have exhausted their gas supply. Preliminary results show that the galaxies are slightly brighter near their center in the optical compared to the UV, but in the disk of the galaxies, the UV images are brighter than the optical images. This could mean that these galaxies indeed have star formation occurring in them.