Undergraduate Research Symposium May 19, 2017 Mary Gates Hall

Online Proceedings

SESSION 1J

MCNAIR SESSION - THE STATE WE'RE IN: BODIES, WORDS, PROPHESIES AND POWER

Session Moderator: Sonnet Retman, American Ethnic Studies

MGH 258

12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

William Faulkner's Portrayal of Women

Erika Lisardi, Senior, English, Bemidji State University
McNair Scholar
Mentor: Gary Rees, Bemidji State University

"William Faulkner's Portrayal of Women" provides an in-depth literature analysis of the role women play in two of Faulkner's major novels, The Sound and the Fury (1929) and The Wild Palms (1939). Following the characterization of Candace "Caddy" Compson and Charlotte Rittenmeyer, my paper confirms the meaning of being a woman in a patriarchal society. Connecting literary and social movements, such as modernism, the development and actions of the characters are explained in terms of the traditional versus modern woman. The paper also calls into question Faulkner's motives behind not fully giving his women literary independence. We see this in Caddy who is never given a voice, but is instead shown to the reader through the eyes of dominant male characters and through Charlotte's incapability to be a mother. The implication of this type of portrayal of women suggest that though Faulkner attempts to embrace the modernist view of women, he cannot fully let go of a tradition that dictates that women are defined by men.

POSTER SESSION 2

Commons West, Easel 36

1:00 PM to 2:30 PM

A Study on the Morphological Variability of *Nucella lamellosa* in the Salish Sea

Wai (Joycelyn) Chui, Senior, Aquatic & Fishery Sciences
Mentor: Gary Winans, SAFS
Mentor: Jacqueline Padilla-Gamino, School of Aquatic and Fishery Sciences

Nucella lamellosa is a common low-intertidal snail in the Pacific Northwest. Unlike its Atlantic Congener *N. lapillus*, there are no recent thorough studies or data available on the morphology of *N. lamellosa* in the Salish Sea. *Nucella* plays an important structuring role in the intertidal ecosystem by preying on barnacles, algae and other bivalves. Moreover, *Nucella* does not have planktonic larva, the young hatch directly into juveniles instead. This unique life history characteristic contributes to a greater likelihood of reproductive isolation between populations. Understanding the morphological variations and environmental influences between populations is crucial for conservation management. *Nucella* lamallosa from up to six locations in the Salish Sea will be individually photographed on the front and back side and the images analyzed as part of the research done with the NOAA Northwest Fisheries Science Center. In Spring 2017, further analyses will be conducted on morphological variations among potential populations. Morphological shape differences will be assessed using three contemporary multivariate approaches as well as color pattern differences. The three multivariate approaches will be Principle Component Analysis, Thin Plate Spline, and Momocs. Shell features such as color, banding, shell thickness will be categorized according to locations to evaluate this source of variability in Salish Sea. Results from the three analyses will be compared and distinguishable populations will be displayed on a map as an outcome

POSTER SESSION 3

Balcony, Easel 105

2:30 PM to 4:00 PM

Identifying Targeting Ligands to Nephrin and NEPH-1 by SELEX

Ritika Jain, Senior, Bioengineering
NASA Space Grant Scholar, UW Honors Program
Mentor: Suzie Pun, Bioengineering
Mentor: Gary Liu, Bioengineering

Many cases of chronic kidney disease are caused by loss of

podocytes, kidney cells that are part of the filtration barrier between the blood and urine, resulting in declining kidney function. Current therapies do not prevent podocyte loss and rely on systemic small-molecule drug delivery, which is less effective and can lead to significant complicating side effects. Therefore, targeted drug delivery to podocytes could more effectively protect against injury, prevent further loss, and halt disease progression to kidney failure. To effectively deliver drugs to these cells, ligands that bind with high affinity to proteins specific to podocytes must be developed. Aptamers, DNA- or RNA-based ligands, are advantageous because they can be generated using standard techniques and are easily reproduced. Here, systemic evolution of ligands by exponential enrichment (SELEX) was used to identify aptamers that bind to His-tagged nephrin and NEPH-1, two membrane proteins highly specific to podocytes. First, a large library (on the order of 6×1014 sequences) of randomized single-stranded DNA (ssDNA) was incubated with nephrin or NEPH-1, and protein-aptamer complexes were isolated using His-tag capture beads. Beads were washed to remove any unbound ssDNA, and bound ssDNA were then isolated. This pool will be narrowed further by applying additional selection stringencies over the course of several rounds, ultimately resulting in a small final pool of aptamers with high specificity and affinity to these desired targets. Libraries from selected rounds will be tested for binding to target proteins to monitor selection. Through SELEX, we anticipate finding a small pool of aptamers capable of binding to recombinant nephrin and NEPH-1, and will next validate individual aptamer sequences for their ability to bind to these proteins in vivo. These identified aptamers can be further used to develop a targeted drug delivery platform to podocytes.

POSTER SESSION 4

Balcony, Easel 115

4:00 PM to 6:00 PM

Ablation of NFkB-p65 Prevents Myocardial Injury, Pathological Remodeling, and Ventricular Dysfunction after Myocardial Infarction

Rachel Steinmetz, Senior, Biology (General)
Mentor: Qinghang Liu, Physiology and Biophysics

In addition to its known roles in regulating cell survival, inflammation, and cardiac hypertrophy, the transcription factor nuclear factor-kB (NFkB) has been implicated as a maladaptive mediator of cardiac ischemic injury, but the underlying mechanisms remain undefined. Our objective was to assess the contribution of NFkB-p65 to myocardial injury, pathological remodeling, and ventricular dysfunction after myocardial infarction using cardiac-specific knockout mice. Intriguingly, ablation of NFkB-p65 in the heart protected against adverse remodeling and heart failure following myocardial infarction for 2 weeks. NFkB-p65 knockout mice showed reduced cardiac hypertrophy, fibrosis, and pulmonary congestion compared to control mice. Better-preserved cardiac function and less ventricular dilation were also observed in NFkB-p65 knockout mice after MI. NFkB-p65 knockout and control mice were also subjected to acute ischemia/reperfusion (I/R, 60 min ischemia & 24 h reperfusion). Loss of NFkB-p65 also protected the heart against acute I/R damage as evidenced by decreased infarct size. Accumulating evidence has demonstrated that oxidative stress participates in several aspects of cardiac remodeling after myocardial infarction, including loss of cardiomyocytes by apoptosis and necrosis, inflammatory/fibrogenic responses, and hypertrophy. Here, we examined the role of NFkB-p65 in regulating cell survival/death induced by oxidative stress. We showed that NFkB-p65 silencing in mouse embryonic fibroblasts significantly reduced necrotic cell death induced by reactive oxygen species (ROS). Specifically, ablation of p65 prevented cellular uptake of propidium iodide induced by H_2O_2 or tBHP (tert-Butyl hydroperoxide), as well as the release of HMGB1 (high mobility group box 1) into culture supernatant (a biomarker of necrosis). No changes in apoptosis markers were detected under these conditions, suggesting that NFkB-p65 mediates ROS-induced necrosis, but not apoptosis. These results identified a novel role for NFkB-p65 in mediating myocardial injury and ROS-induced necrosis, suggesting that NFkB-p65 may serve as a therapeutic target for myocardial damage and remodeling following myocardial infarction.