UNIVERSITY of WASHINGTON

Undergraduate Research Symposium May 17, 2019 Mary Gates Hall

Online Proceedings

Poster Session 3

Balcony, Easel 105

2:30 PM to 4:00 PM

Investigating the Role of PTEN Variants in Cell Growth and Genome Stability

Zach Andrew Krieger, Senior, Biology (Molecular, Cellular & Developmental)

Mary Gates Scholar

Mentor: Douglas Fowler, Genome Sciences

Mentor: Nicholas Hasle, Genome Sciences

PTEN is a tumor suppressing protein that carries out important cell functions such as inhibiting cell growth and promoting genomic stability. Somatic variants of PTEN can lead to cancer, and PTEN mutational status has shown to be an indicator of patient survival and prognosis. However, it is not clear whether cancer-associated PTEN variants affect cell growth, genome stability, or both. Here, we demonstrate that simple competition assays can quantitatively assess PTEN variants for their effect on these two important cellular functions. Cells expressing cancer-associated PTEN variants tagged to blue fluorescent protein are mixed with cells expressing wild-type (WT) PTEN tagged with a red fluorescent protein. The proportion of blue and red cells are analyzed over several days using flow cytometry. If the variant does not repress cell growth, variant (blue) cells will outcompete their WT (red) counterparts. To modify the competition assay for genome stability assessment, cells are treated with a PI3K inhibitor and the genotoxic chemotherapeutic temozolomide. These drugs isolate the genomic stability function of PTEN by removing its role in cell growth and causing genome instability, respectively. Here, cells harboring variants that cannot repair temozolomide-induced DNA lesions will be outcompeted by their WT counterparts. The assay generates a score that is based on the rate of change of variant populations relative to the WT population to quantitatively define the phenotype. Results can be interpreted to establish a relationship between a PTEN variant and its quantitative effect on the cell growth or genomic stability functionality of PTEN. Furthermore, the growth-based nature of these assays means that in future work they can be adapted to a pooled library format, allowing the simultaneous, quantitative assessment of thousands of PTEN variants. Data from both low-throughput and high-throughput experiments bring clarity to the relationship between specific PTEN functions and patient prognosis.

Poster Session 4

MGH 206, Easel 168

4:00 PM to 6:00 PM

Altering Pause Rate in Crow Call Sequences

Jared D. Slattery, Senior, Biology (Bothell Campus)

Ileana Monserrat Rodriguez, Senior, Biology (Bothell Campus)

Mentor: Douglas Wacker, School of STEM, Division of Biological Sciences, University of Washington Bothell

The American crow (Corvus brachyrhynchos) emits a variety of vocalizations, but the meaning of these calls is not well understood. To better understand crow vocal communication, we tested whether the playback of call sequences with accelerated, decelerated, or randomized pauses, or bouts of silence between calls, caused different behavioral responses in wild crows. Previous research has shown that the pattern of silence between call syllables may code important information in this species. We manufactured crow vocal sequences using Audacity audio editing software to produce variations of the same overall sequence with differing pause rates. We then played them to crows on diurnal foraging areas in Western Washington and measured the latency to move towards the playback speaker, closest approach, and the number of crows responding. After 20 trials we detected non-significant trends suggesting an effect of pause rate. We are currently increasing our sample size in an attempt to resolve these trends.

Poster Session 4

MGH 206, Easel 167

4:00 PM to 6:00 PM

Aggressive Interactions Between American Crows (*Corvus brachyrhynchos*) in a Pre-Roost Aggregation

Lauren Chantalle Taylor, Senior, Biology (Bothell Campus)

Mentor: Douglas Wacker, School of STEM, Division of Biological Sciences, University of Washington Bothell

The North Creek Wetlands Restoration on the University of Washington Bothell campus is host to a communal crow roost, with upwards of 16000 crows in the autumn and winter and significantly fewer during the spring and early summer. Crows congregate in larger and larger groups, called pre-roost aggregations, as they approach their roost each night. The

function of these aggregations is not yet clear. We set up a night vision video camera and four audio recorders to observe the social behavior of crows on a pre-roost aggregation on the roof of Discovery Hall, adjacent to the aforementioned communal roosting site. The average duration of stay at this pre-roost aggregation was 24 minutes. We assessed video footage using a mix of scan and ad libitum sampling with a focus on aggressive interactions. We defined aggressive interactions between crows as approaching, pecking, and tail and wing pulling. I compared the frequency of these interactions for crows in the breeding and non-breeding seasons. Preliminary analyses suggest a significant increase in tail pulling during breeding (2.9 +/- 0.8) as compared non-breeding periods (0.3 +/- 0.3), but no differences in approaching, pecking, and wing pulling between these life history stages. I am currently increasing my sample size to better discern any differences, and am beginning to investigate social dynamics in pre-roost aggregations using social network analyses.