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Comparing Rates of Evolution in Arthropod DNA Damage Repair Genes

Poster Presentation

Exposure to ultraviolet radiation is well known to cause DNA damage and mutations leading to diseases as severe as skin cancer in humans or even death. Organisms such as *Daphnia pulex* live in shallow areas of water which can be directly exposed to sunlight and therefor ultraviolet radiation. I am investigating how exposure to ultraviolet radiation affects the rate at which organisms within the Arthropoda family evolve this is based off previous work done by Professor Brooks Minor which explored how different levels of exposure to ultraviolet radiation affected the diversity within neighboring *Daphnia pulex* populations. This can be quantified by creating a Ka/Ks ratio of genes associated with DNA damage response for each arthropod of interest. I will then compare these ratios in order to create a phylogeny of arthropods that visualizes how DNA damage affects the rate at which these organisms evolve in a variety of ecosystems.

I began with a list of known DNA damage genes in the model organism *Drosophila melanogaster* which I then used to search for orthologous genes in a series of diverse arthropods for which DNA sequence data is available. Once I had access to the genomes of the arthropods of interest I used command line BLAST and python scripts to identify these DNA damage orthologs. The next steps involve other programs including MUSCLE and PAML to calculate the Ka/Ks ratios of these organisms. I will present on how the results of this ongoing research confirm or deny the hypothesis that higher exposure to ultraviolet radiation is associated with faster rates of evolution.