CBCB SEMINAR 5/11/2020

3:30 PM
ZOOM:
https://udel.zoom.us/j/541046654

bioinformatics.udel.edu

BIOINFORMATICS SEMINAR

ZACH SCHREIBER

PhD Student, Department of PLSC UNIVERSITY OF DELAWARE

UNCOVERING VIRAL DARK MATTER

Microbes play an important role across all ecosystems and viruses influence these communities by acting as ecological drivers while also providing a large source of genetic diversity. Deep sequencing across whole microbial communities has yielded a reservoir of information; however, results often show a lack of homology among environmentally sampled sequences when compared to known databases. This lack of annotated viral genes has been classified as viral dark matter and can occur in more than half of the surveyed sequences. Here, we aim to shed light on unclassified metagenomic viral proteins' functions by assuming gene neighbors often share complementary function. The overall concept is driven by a network based analysis on predicted peptide open reading-frames or (ORFs) that are positioned along assembled contiguous reads (contigs). By clustering all ORFs at a 40% sequence identity, analysis can then be made on the interactions between these ORFs and neighboring clusters that fall within a specified proximal range. Each cluster and interacting neighbor is mapped onto a network and various statistical methods are used to associate unassigned proteins to known neighbors therefore, implicating possible functional attributes. The ribonucleotide reductase class 1 alpha and beta subunits were used as a foundation to explore previously overlooked unknown ORFs within metagenomic data sets. This approach has identified a number of unclassified ORFs through multiple layers of validation and illustrate viral dark matter as more than just random noise.

ADAM PATER-FARANDA

PhD Student, Department of CIS UNIVERSITY OF DELAWARE

TRANSCRIPTOMIC INSIGHT INTO THE MECHANISMS OF ANIRIDIC CATARACT

Aniridia is a congenital disorder affecting the eye, occurring when a person has only one functional copy of the Pax6 gene due to either a spontaneous or an inherited mutation. The iris is typically absent at birth or else severely deformed. While dramatic, this early complication of Aniridia is manageable when compared to the blinding sequelae that manifest later. In particular, individuals with Aniridia are predisposed to early onset cataract, an opacification of the ocular lens. These individuals typically have clear lenses at birth that appear outwardly healthy. Our lab is investigating why Pax6 haploinsufficient lenses appear to develop properly but fail much sooner than do lenses with two functional Pax6 alleles. The Pax6 gene encodes a transcription factor that is central to eye development during embryogenesis. In the postnatal lens, Pax6 continues to be expressed in epithelial cells that differentiate into the fiber cells which make up this tissue's bulk. While it is known that Pax6 is necessary for this process during development, the function of Pax6 in juvenile and adult tissues is less well understood. To address this knowledge gap, the Duncan lab undertook an RNA sequencing study investigating the consequences of Pax6 haploinsufficiency in the lens, using mice at 20 weeks age, an age comparable to the late 20's in humans. This study revealed substantial Pax6 dependent transcriptomic remodeling, particularly in pathways known to contribute to lens fiber cell production and fibrotic disease. Experimental validation of this study's findings may eventually lead to therapies that help Aniridia patients preserve the clear lenses they are born with.

College of Engineering
CENTER FOR BIOINFORMATICS & COMPUTATIONAL BIOLOGY

JOIN US VIA ZOOM:
https://udel.zoom.us/j/541046654

Dial by your location: +1 312 626 6799 US (Chicago) or +1 646 876 9923 US (New York)
Meeting ID: 541 046 654