

Cell Bio 2023 Session: ORFans and proto-genes: Engaging students in bioinformatics through the study of yeast genes of unknown function

Saturday Dec 2, 1-2 pm

Jill Keeney, Juniata College, keeney@juniata.edu

<https://www.yeastorfanproject.com/>

1. Explore genes of unknown function annotated in SGD.
 - A. Top menu-"LAB MODULES". These are the bioinformatics modules developed to explore the function of genes annotated on the SGD: Saccharomyces Genome Database (SGD).
<https://www.yeastgenome.org/>
 - a. Eight modules guide students through the resources available to explore gene function in yeast. Note: resources are constantly changing, so there will be links/tools that are no longer active.
 - B. Selecting ORFs: top menu: "ORFANS". Information on how ORFs are described (including gene ontology) and how to search for ORFs of unknown function. Upper level students can explore on their own.
 - C. Best to choose ORFs that have at least one shared domain and some physical interactors of known function. This gives students something to explore.

2. Protogenes-genes not annotated in SGD.
 - A. What is a proto-gene? Genomic scientists have proposed that pervasive translation generates a reservoir of "proto-genes" that promote de novo gene birth by exposing genetic variation to natural selection in the form of novel polypeptides. Some proto-genes are occasionally retained by selection and become de novo genes, but most eventually return to a non-genic state
 - B. Top menu-LAB MODULES → Yeast "adopt a proto-gene" project*
 - a. Five modules guide students through genome browser, exploration of gene structure, and alignment of ancestral sequences. Can use some or all.

*The "adopt a proto-gene" initiative is support by an NSF-CAREER award to Anne-Ruxandra Carvunis, Associate Professor in the Department of Computational and Systems Biology at the University of Pittsburgh School of Medicine