VEuPathDB
Eukaryotic Pathogen, Vector & Host Informatics Resources

Mining Proteomics Data

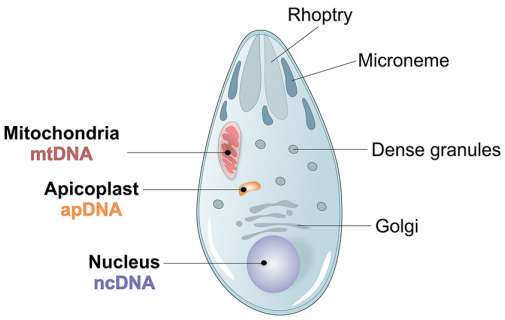
Protein expression in *P. falciparum* apicoplast vs. ER

Learning objectives

- Explore proteomics data on VEuPathDB
- Perform a quantitative mass spec. evidence search

Introduction

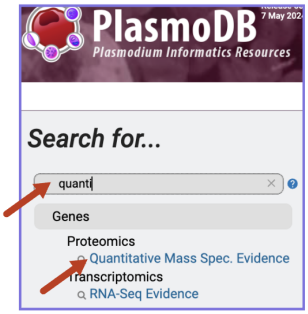
The malaria parasite Plasmodium falciparum and other Plasmodium species contain a non-photosynthetic plastid organelle called the apicoplast that is crucial to the malaria parasite's survival. Due to the algal origin of the apicoplast (which contains its own DNA), many proteins and pathways are not shared by the human host, making it an attractive target for antimalarial drugs.



To identify genes that are unique to the apicoplast and not present in human hosts, we could ask the question: **What genes in Plasmodium falciparum have protein products that are present at a higher concentration in the apicoplast compared to the endoplasmic reticulum (ER)?** Furthermore, we can leverage protein subcellular localization data to limit the results to the apicoplast.

Overview of the search strategy: Use **Quantitative Mass Spec. Evidence** search in two steps-
(1) identify genes that are upregulated in apicoplast vs. ER
(2) intersect that search with an apicoplast localization search

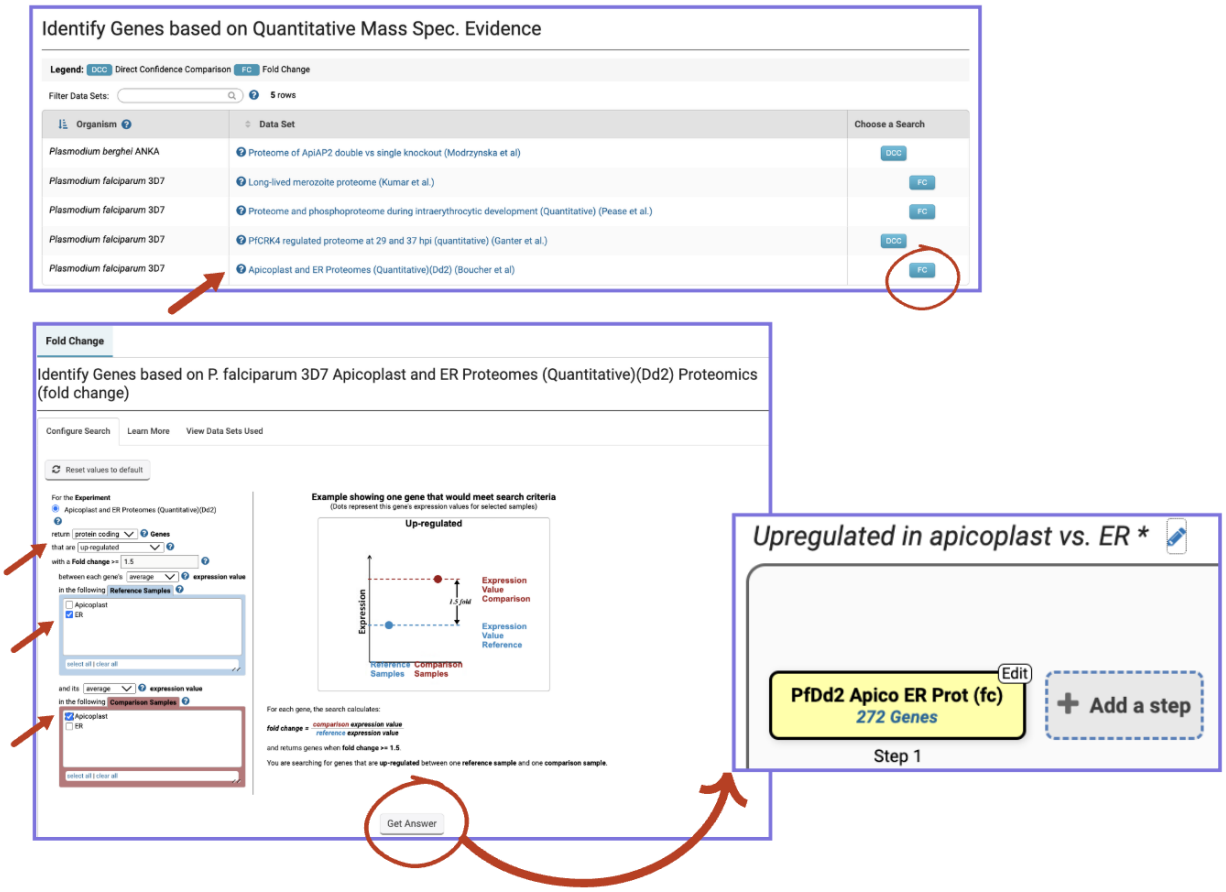
1. Navigate to PlasmoDB.org



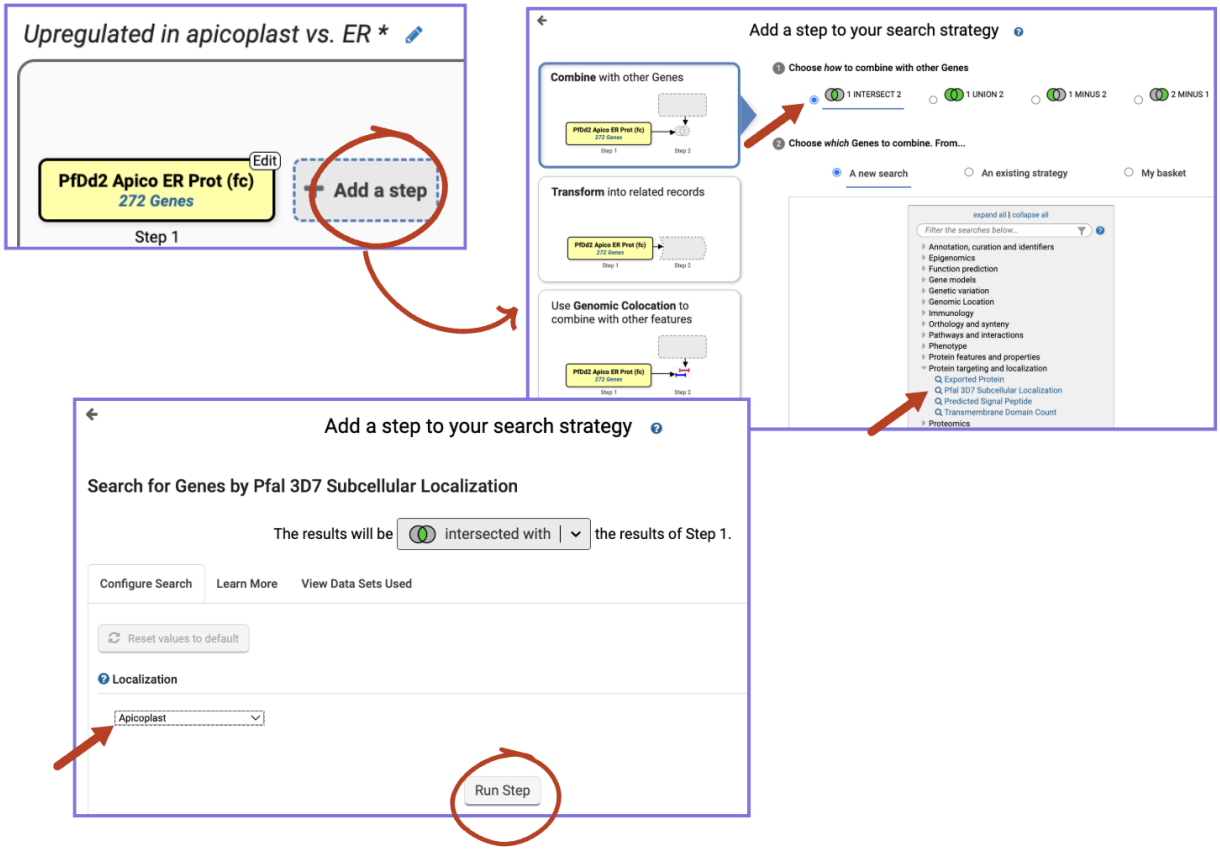
2. From the sidebar or header, search or scroll for “quantitative” and click on **Quantitative Mass Spec. Evidence**

3. Run a search to find genes that are upregulated in the apicoplast sample compared to the ER sample.
    a. Select the experiment called **Apicoplast and ER Proteomes (Quantitative)(Dd2) (Boucher et al)**- it compares the samples we are interested in.
    b. Choose the fold change (FC) search.
    c. Configure this search to return all genes that are upregulated by 1.5 fold in the apicoplast sample compared to the ER sample.

How many genes did you get that have upregulated protein expression in apicoplast compared to ER?



4. Limit the results by leveraging available subcellular localization data. PlasmoDB has a data set that returns genes with the transit peptides that mediate protein targeting to the apicoplast.
    a. Click on the **add step** button and find the **subcellular localization** search
    b. Make sure Apicoplast localization is selected and click on the Run Step button



5. How many genes did you identify? Explore your results.

    Are you more confident that these genes are apicoplast genes? How would you use the PlasmoDB tools to boost your confidence in these so-called apicoplast genes?