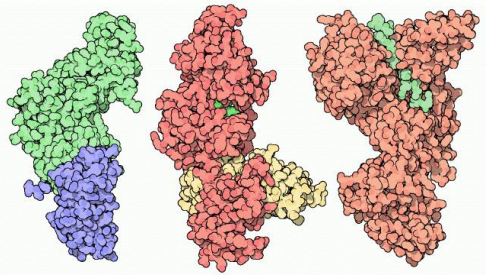
Biology I: PDB Project

Name _____

Section _____



Our class discussion have moved from the basic unit of construction of the protein, the amino acid, to how amino acids are linked together and work together to form the four levels of protein structure. Let's finally look at some these proteins!

The PDB (Protein Data Bank) is a database that holds structural data about many proteins, including the "normal" form to the "mutant" forms. Researchers from all over the world use the PDB to deposit their research and compare their proteins to other similar proteins.

Using information from the database we learn about the different properties of a protein, but we can also view its 3-D structure. As we have discussed in class, the key to protein functionality is the complex interplay of many levels of protein structure to form its final shape. The following project is meant to help quantify this objective.

Assignment Guidelines

PART A

1. Go to www.pdb.org
2. Click on the "Molecule of the Month" and read the following overview.

This is tremendous resource that explains the basic function of many critical proteins. Choose one and read the associated pages.

Part B – Viewing your protein

1. Choose an ENZYME from Molecule of the Month. Note the list can be sorted alphabetically for ease of use. (see the link)
2. In a well-structured paragraph, write a summary (**in your own words**) of the protein's function.
3. What are the implications, if any, if the mutant form of the protein is present?
4. Click on the link that is a PDB file for your protein. Do this by clicking on the PDB ID for your protein (e.g. Superoxide Dismutase's ID is 2sod). You will see the PDB record. Note the side menu and open the display file command. You will see a variety of ways to view your protein. I recommend "Jmol Viewer". This is a browser based viewer and only requires a plugin. View your protein through this program. Right-click and you have more rendering options. Play around with the different views. Make notes on the structural motifs (distinctive forms) that you may see. How many helixes? Sheets? Disulfide bridges?

PART C – Another way to view your protein

5. Firstglance is another program that allows you to view your protein. This program is easier than the above version.
Go to http://molvis.sdsc.edu/fgij/index.htm

Instead of right clicking the image there are simple toggle buttons that manipulate your protein. (I recommend turning off the spin!)

6. Play around with the different commands on the right-hand side.

7. Using **Alt-Prt Scrn** command screen capture the window with your protein. You can then paste into word document. Capture three images of your protein with varying display. Use the Crop command to just show the protein and eliminate the other parts of the screen. Use your diagrams to illustrate any protein functions you are emphasizing.

FINAL PRODUCT

3 DISPLAYS OF YOUR PROTEIN
-highlight in one of them the active site (point to it!)

Summary of your Protein

-How does its structure allow it to carry out its specific function?
- How many alpha helices, beta sheets, and disulfide bridges does it have?
- What are the implications if the mutant form of the protein is present?
- Can you find any other interesting facts about your protein?