**Lab sheet #8**

**Structure visualization using Jmol**

**Objectives:**

* Download protein sequence as PDB format
* To be familiar with structure visualization program (Jmol)
* Display 3D structure of a protein, change its view, color and select motifs by writing commands

**Use Jmol program to perform the following:**

**Jmol** is a free molecular viewer, used to create and view three dimensional structures of proteins.

**Exercise (1)**

1. Open Protein Data Bank (**PDB**) website, Search for **1B0U** protein; which is the PDB ID of ATP-binding subunit of the histidine permease from *salmonella typhimurium*.
2. Download the protein sequence as **PDB format**.
3. Open Jmol program and open the protein sequence file.
4. Change Style display from Atom style to **Cartoon** scheme style.
5. Open the console window, change the **color** of the whole structure to **grey**.
6. Open the protein page in protein database (NCBI) to know the different motifs of the protein and their location.
7. Select the **Walker A/P-loop motif** (39-46), and color it by blue.
8. Select the **ABC transporter signature motif** )154-163(, and color it to green.
9. Select **Walker B motif** )174-179(, and color it red.
10. Show the ATP **ligand** as **Ball and stick** scheme style.
11. Show which one is closest to **Walker A/P-loop motif** and measure the **distance** between them.
12. Change the measurement unit from **nm to Angstroms**.
13. Save the protein structure as a picture.

**Exercise (2)**

1. Open Protein Data Bank (**PDB**) website, Search for **1TRZ** protein; which is the PDB ID of Human Insulin hexamer.
2. Go down to the molecule description to see how many **chains** does insulin have.
3. Download the protein sequence as **PDB format**.
4. Open Jmol program and open the protein sequence file.
5. Change Style display from Atom style to **Cartoon** scheme style.
6. Change Style display to **Backbone 1.5** scheme style.
7. Turn cartoon style off.
8. Select sheets and color it green.
9. Select helix and color yellow.
10. Show cysteins (Sulfur) that forms disulphide bridges “showing how the polypeptides hold together through S-S bonds”. Change to wireframe 1.25 and color them blue.
11. How many disulphide bonds are found in insulin protein?
12. Show for each disulphide bridge the position of each Cys and the chain involved.
13. Move the structure 360º.
14. Save the protein structure.