**Bioinformatics Worksheet #2: BLAST Practice - Assignment**

**Group Number:\_\_\_\_\_6\_\_\_\_\_\_\_\_**

**Names of individuals in group:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Mystery bacterial operon #: Operon 6**

**Table 1: Table of results for 8 largest proteins in operon**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Protein #** | **Length (base pairs)** | **Length (amino acids)** | **E-value** | **Query Cover** | **% Identity** | **Protein name – brief description** |
| 1 | 1596 | 531 | 0.0 | 100 | 100 | [anthranilate phosphoribosyltransferase](http://www.ncbi.nlm.nih.gov/blast/Blast.cgi#alnHdr_487394439) |
| 2 | 1563 | 520 | 0.0 | 100 | 100 | [unnamed protein product [Escherichia coli]](http://www.ncbi.nlm.nih.gov/blast/Blast.cgi#alnHdr_43196) or[anthranilate synthase component 1](http://www.ncbi.nlm.nih.gov/blast/Blast.cgi#alnHdr_556507571) |
| 3 | 1362 | 431 | 0.0 | 100 | 100 | [anthranilate phosphoribosyltransferase](http://www.ncbi.nlm.nih.gov/blast/Blast.cgi#alnHdr_487621359) |
| 4 | 1194 | 397 | 0.0 | 100 | 100 | [tryptophan synthase subunit beta](http://www.ncbi.nlm.nih.gov/blast/Blast.cgi#alnHdr_608100720) |
| 5 | 807 | 269 | 0.0 | 100 | 100 | [tryptophan synthase subunit alpha](http://www.ncbi.nlm.nih.gov/blast/Blast.cgi#alnHdr_446365209) |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |

1. What organism did this operon come from? What evidence did you use to come to this conclusion?

**Escherchia Coli, http://www.ncbi.nlm.nih.gov/nuccore/J01714.1**

**Evidence from the fact that all of the best matching proteins were from this organism.**

1. Are the functions of the genes found in this operon related? What cellular system do you think this operon and the genes contained are involved in?

**Yes, the functions are related. The genes are involved in the biosynthesis of the amino acid Tryptophan.**

1. Do some research using NCBI (<http://www.ncbi.nlm.nih.gov>) and other internet resources to learn about the system. What role does this system have in this organism? Create a hypothesis about what might happen to the organism if these genes were deactivated.

**Tryptophan is an amino acid, making it necessary in the production of proteins. This system produces tryptophan when the organism needs it and is shut off by negative feedback.**

**Hypothesis/prediction: If this operon were deactivated somehow, the organism would be unable to synthesize their own tryptophan and certain proteins would not be able to be constructed.**

1. Share what you learned with the other groups and write down what you learned about the other systems.

**Various answers**

**Bonus**: Go to RCSB Protein Data Bank (<http://www.rcsb.org/pdb/home/home.do>) and search for one of the proteins you found by name. You may not be able to find it for your organism, or at all, but here you can see the structure of the protein determined by protein crystallography. Count the number of beta pleatings and alpha helixes. Are there any ligands associated with this protein? Are there any other units for this protein? If so, name them. Be sure to look at the protein in the 3-D view.

**Name of protein you investigated**:\_\_ trpD \_\_\_\_\_\_\_\_\_\_\_\_\_

**Number of Beta-pleated sections**:\_\_\_\_\_\_ 12% beta sheet (10 strands; 42 residues)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Number of alpha helix sections**:\_\_\_\_\_\_ 53% helical (20 helices; 175 residues)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Associated ligands?**\_\_\_\_\_\_\_\_\_\_\_\_\_\_Glycerol and sodium ion\_\_\_\_\_\_\_\_\_\_\_\_\_

Additional subunits for protein?\_\_\_\_\_\_\_\_None\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Provide a rough 3-D sketch of the protein

