

Lab 20 – Using Microinformatics to Investigate Evolutionary Relationships: More a BLAST!

Introduction:

Genome-wide (or **whole**) **genomics** studies entire informational molecules (e.g. genomes) of the **Human Genome Project**, some also including and analyzing **20,000** or **25,000** genes that define a human being. This project also systematically mapped the genomes of other species, including the fruit fly, mouse and *Drosophila*, etc. The genome also includes sequencing of the parental strand of DNA against and assembling the fragments into a whole and then comparing.

Why is this information important? Along with the identify that genome location and sequence of human genes tell about our human evolution genetic structure. In addition, learning about the sequence of genes in other species help us understand evolutionary relationships among organisms. Many of our human are identical or similar to those found in other species.

However, you identify a single gene that is responsible for a particular disease in fruit flies. Is this same gene function identical? Does it have similar effect? It should take you really a lot more time to find the same human genome to try to locate the same sequence of bases as that in fruit flies. This difficulty can be solved, via sophisticated technological method is needed.

Microinformatics is a field that combines statistics, mathematical modeling, and computer assisted analysis biological data. Using microinformatics methods, entire genomes can be quickly compared to find the shared genetic similarities and differences. An extremely powerful microinformatics tool is **BLAST**, which stands for **B**asic **L**ocal **A**lignment **S**earch **T**ool. Using **BLAST**, you can input a gene sequence or identify a particular gene sequence. Because the identity of similar sequences is a matter of chance.

In this investigation, you will use **BLAST** to compare similarities and differences information as measured in **alignments**. An alignment (also called **homologous** gene) is an **evolutionary relationship** representation of species. **Figure 1** below depicts a typical alignment.

Note that the alignment is identical with **homologous** and **evolutionary relationship** as specific species. The other two are **species** and **evolution** to which they are **evolutionarily** they share common ancestor.



Figure 1. A simple diagram of the Phylogenetic tree.

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D Kirk

A red circular graphic with a gradient, appearing as a stylized arrow or a decorative element, positioned to the right of the 'D Kirk' text.

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