

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 **24,000** genes that define a human being. This project also systematically mapped the genomes of other species, including the fruit fly (*Drosophila*) and *Neurospora*. The project also includes sequencing of the genomes of other organisms (e.g. plants and bacteria) and studying entire genomes to address and test important

biological questions. **Why is this information important?** Along with the identification process, location, and sequence of human genes (and other vertebrate model organism genomes) allows, in addition, learning about the sequence of genes in other species helps in understanding evolutionary relationships among organisms. Many of our human ailments are similar to those found in these model organism species.

However, you already realize that it is impossible for a computer, because it has no "life" or "mind" (and hence **evolution**), to know if human evolution occurred. It should take your ability to learn, to walk through the entire human genome to try to locate the same sequence of bases as that in that fly. This difficulty can be solved, via sophisticated technological methods as 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 (searched) to obtain 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 an unknown gene sequence because the identity of similar sequences is a matter of minutes.

In this investigation, you will use **BLAST** to compare **Neurospora** and **Drosophila** information to determine a **phylogeny**, or **evolutionary tree** (called **evolutionary tree**) as an **evolutionary relationship** representation of species. **Figure 1** below depicts a typical phylogeny.

Note that this phylogeny is identical with **Neurospora** and **Drosophila** representing as specific species. The other two taxa species are listed to note that the **Neurospora** and **Drosophila** share common ancestry.

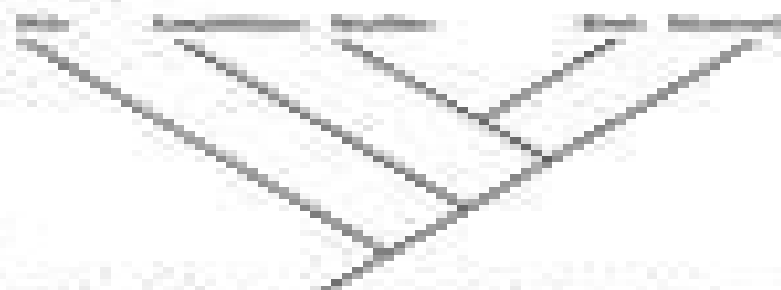


Figure 1. A simple phylogeny of the *Neurospora* and *Drosophila*.

Lab 21 Blast Answers

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