Structure of Human Immunodeficiency Virus (HIV)

Hands-On Eleven
Human Immunodeficiency Virus

We are going to explore the HIV genome.

- Go to NCBI at: http://www.ncbi.nlm.nih.gov/projects/gorf. We are going to use "ORF finder" to locate the open reading frames of HIV.
- Get the Homo sapiens genomic sequence "hiv_sequence.txt" from http://www.cs.sjsu.edu/~khuri/Biology221T.
- Paste the sequence in the ORF window under "sequence in FASTA format" at NCBI.
- Hit the "OrfFind" button.

On the resulting page from NCBI:

- Change the sensitivity from 100 to 300 and click on "Redraw".

1) How many ORFs are reported by the ORF finder with sensitivity 300? ____ .

2) Write down the exact start and end points for each predicted ORF.

Frame	Starting Position	End Position	Length

3) Note that by clicking on the bars that represent the individual ORFs, we get the sequence of that reading frame including its translation.
- Click on the longest ORF. Keep "blastp" under "Program" in the new page.
- Choose "swissprot" under "Databases" and click on "BLAST".
- Accept all the default values from the new page and click on "View report".

Examine the result and identify the name of the gene.

- Label the appropriate ORF in the diagram with the name of the gene you found. In other words, write the name of the ORF (gene) on the following diagram.
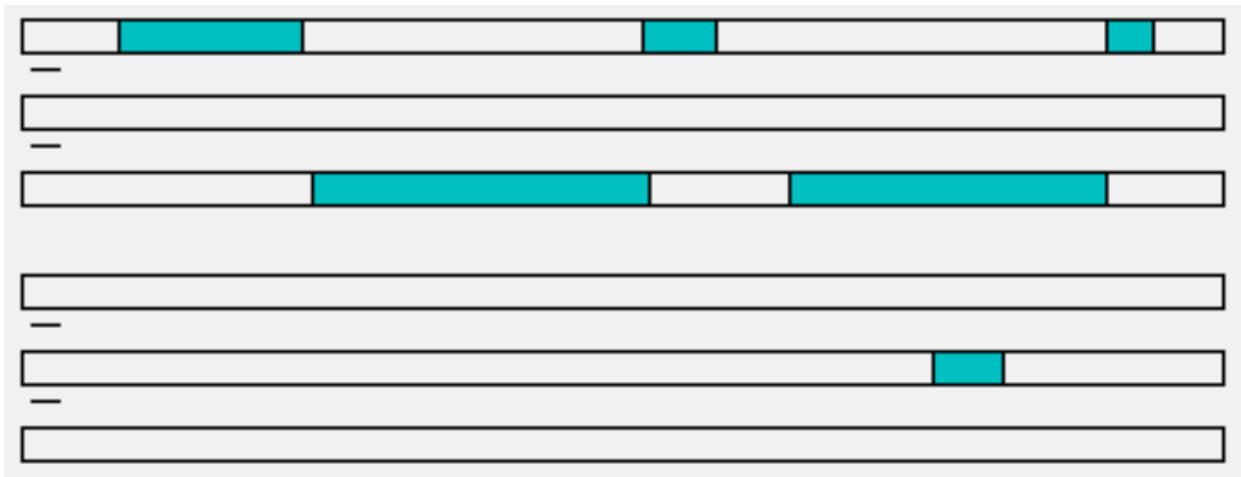
4) Repeat the process described in part 3 with all the ORFs (genes) that are on the positive strand.

5) What organism does the "hiv_sequence.txt" most probably come from? Why?

6) Consult the second page of the hands-on exercise.

The original source is at:
http://hiv-web.lanl.gov/content/immunology/pdf/2000/intro/GenomeMaps.pdf

The diagram has 3 genomes.
Based on your findings above, which genome (HIV-1, HIV-2, SIV) are you working with?

7) In parts 1 thru 4 you found some ORFs that encode genes. Are they all in "Genome Maps"? _____

8) Which genes did you miss? In other words, which genes are in "Genome Maps" and not in the diagram you completed in parts 3 and 4? Just name the 2 or 3 large genes you missed.

9) Explain how you can find the genes (ORFs) you missed.

10) Name two genes on the positive strand that overlap.