

Introduction to Bioinformatics

We have isolated over 130 phages from soil at Nyack College using several different bacterial hosts. Several were sequenced and our goal is to try to figure out genes present in the phage which help us to understand it. This is called annotation which we will be working on this semester using bioinformatics.

SEAPHAGES Bioinformatics Guides <https://seaphagesbioinformatics.helpdocsonline.com/home> This is a reference manual and all the work which we will be doing is explained in this guide.

Read the following primer on phages and answer the questions:

<https://seaphagesphagediscoveryguide.helpdocsonline.com/3-0-overview>

Questions

- 1) What are phages?
- 2) What is the difference between a lytic phage and a temperate phage?

Read the following page on bioinformatics and answer the questions below:

<https://seaphagesphagediscoveryguide.helpdocsonline.com/13-0-preview>

Video on DNA replication, transcription, and translation: <https://www.youtube.com/watch?v=6gUY5NoX1Lk>

Bacteriophages (called phages) generally consist of DNA (the virus which causes COVID-19 is an RNA virus) which is made of polymers of the nucleotides adenine (A), thymine (T), guanine (G), and cytosine (C). A nucleotide is a basic unit of DNA, composed of a sugar molecule, a phosphate group, and a base (A, T, G, or C). DNA is double stranded and follows the following rules:

A-T (A pairs with T)

T-A

C-G

G-C

Questions

- 3) If DNA has the following sequence on one strand, what is the sequence on the complementary strand?

3' ...C G A C T C A G C C T A G C T...5'

4) What is the central dogma? Why is it important?

5) If the DNA in Question 3 is transcribed what is the sequence of the RNA?

3' ...CGACTCAGCCTAGCT...5'

6) If the RNA is translated, what would be the primary sequence of the protein? Genetic code below

		Second Letter					
		U	C	A	G		
1st letter	U	UUU Phe UUC UUA Leu UUG	UCU Ser UCC UCA UCG	UAU Tyr UAC UAA Stop UAG Stop	UGU Cys UGC UGA Stop UGG Trp	3rd letter	U C A G
	C	CUU Leu CUC CUA CUG	CCU Pro CCC CCA CCG	CAU His CAC CAA Gln CAG	CGU Arg CGC CGA CGG		U C A G
	A	AUU Ile AUC AUA AUG Met	ACU Thr ACC ACA ACG	AAU Asn AAC AAA Lys AAG	AGU Ser AGC AGA Arg AGG		U C A G
	G	GUU Val GUC GUA GUG	GCU Ala GCC GCA GCG	GAU Asp GAC GAA Glu GAG	GGU Gly GGC GGA GGG		U C A G

7) Watch the overview PHAGESDB video

8) Watch the PECAAN video

9) Login to PECAAN using your password which I have provided

- 10) Watch <https://seaphages.org/video/90/>
- 11) Write any questions which you may have.
- 12) Upload to the Dropbox