

INS Biology Workshop 04-01-08

HOMEWORK DUE NEXT TUESDAY: Conceptual review questions from CHAPTER 17.

1. Great bamboo lemurs eat only the shredded bark of bamboo stalks. There are ongoing investigations to determine how they survive because the bamboo contains large quantities of cyanide. If you consumed a pound of shredded bamboo under completely anaerobic conditions, how many molecules of NADH, FADH₂ and ATP would you make?

2. Pirates sailing on their ship and see other ships in the distance. The first mate says to the captain, "Captain it is the enemy! There are two ships with 100 men on them, what shall we do?" The captain says, "We fight them! Bring me my red shirt! That way if I am wounded they will not see the blood and gain hope." The first mate runs and gets the shirt. The pirates fight the other pirates and win. Two weeks later they see more ships. The first mate says to the captain, "Captain it is the enemy! There are three ships with 150 men on them, what shall we do?" The captain says, "We fight them! Bring me my red shirt! That way if I am wounded they will not see the blood and gain hope." The first mate runs and gets the shirt. The pirates fight the other pirates and win. A few weeks later they see more ships. The first mate says to the captain, "Captain it is the enemy! There are ten ships with 1500 men on them, what shall we do?" The captain says, "Bring me my _____ shorts!" (Fill in the blank)

3. Describe initiation, elongation, and termination of a) transcription and b) translation in prokaryotes and eukaryotes.

4. Draw a schematic of a gene entire gene that encodes for protein X and label all parts. Draw the primary transcript for that gene and label all parts. Draw the mRNA for that gene and label all parts.

5. Arrange the following molecules in the correct order according to the disruption of the enzyme that catalyzes their formation in a metabolic pathway (+, molecule is present, -, molecule is absent). Draw this process out.

	Molecule A	Molecule B	Molecule C	Molecule D
Enzyme 1	-	-	-	+
Enzyme 2	-	+	-	+
Enzyme 3	-	+	+	+

6. Describe the difference between transcriptional, translational and post-translational control.

7. Describe a genetic screen using *E. coli* and replica plating. Draw a picture of it.

8. What is the difference between induced and constitutive gene expression? Provide examples of each.

9. What is the difference between positive and negative transcriptional control?

10. Describe the proteins that *lacY*, *lacZ*, and *lacI* encode.

11. Draw a schematic of the lac operon indicating the locations of the promoter, operator, and genes.

12. *E. coli* cells are in a solution with high glucose and low lactose concentrations. Is the lac repressor bound to the DNA? Explain your reasoning.

13. *E. coli* cells are in a solution with high glucose and low lactose concentrations. Is the lac repressor bound to the DNA? Explain your reasoning.

14. *E. coli* cells with a mutation that deletes the *lacI* gene are in a solution with low glucose and low lactose concentrations. Does transcription of *lacY*, and *lacZ* occur? Explain your reasoning.

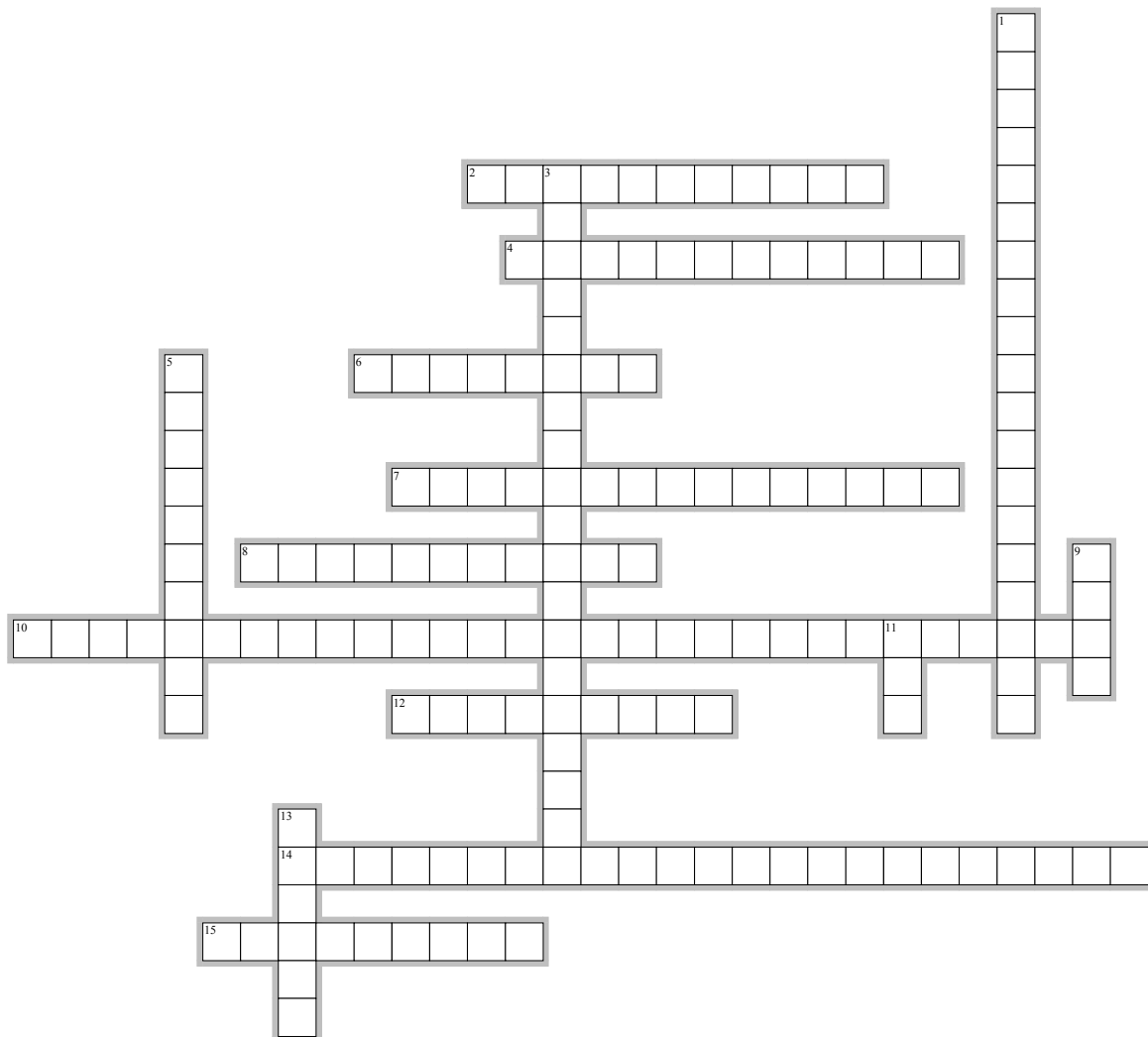
If an answer involves multiple words, please omit spaces and hyphens when entering it into the crossword puzzle.

ACROSS

2. The addition of a methyl group.
4. The regulatory protein that cannot bind the lac operator in the presence of allolactose.
6. Region of DNA that can activate gene expression even at a distance from the promoter.
7. Post-translational modification in which a phosphate is added to a protein.
8. This modification of histones can result in chromatin decondensing.
10. Structural alteration to a protein after its synthesis.
12. Series of adenine nucleotides added to the 3' end of most eukaryotic mRNAs.
14. Region of DNA near a promoter that can influence gene expression.
15. Complex, consisting of proteins and DNA, of which chromosomes are composed.

DOWN

1. Process by which different exons are included in a processed mRNA.
3. Protein that can influence the presence or activity of RNA polymerase at a promoter.
5. In these organisms, transcription and translation occur in separate compartments.
9. This molecule codes for a protein and may be regulated at the level of stability.
11. The activator that binds to DNA in the presence of high levels of cAMP.
13. A group of genes under the control of a single promoter.



ACROSS

2. **METHYLATION**—The addition of a methyl group.
4. **LACREPRESSOR**—The regulatory protein that cannot bind the lac operator in the presence of allolactose.
6. **ENHANCER**—Region of DNA that can activate gene expression even at a distance from the promoter.
7. **PHOSPHORYLATION**—Post-translational modification in which a phosphate is added to a protein.
8. **ACETYLATION**—This modification of histones can result in chromatin decondensing.
10. **POSTTRANSLATIONALMODIFICATION**—Structural alteration to a protein after its synthesis.
12. **POLYATAIL**—Series of adenine nucleotides added to the 3' end of most eukaryotic mRNAs.
14. **PROMOTERPROXIMALELEMENT**—Region of DNA near a promoter that can influence gene expression.
15. **CHROMATIN**—Complex, consisting of proteins and DNA, of which chromosomes are composed.

DOWN

1. **ALTERNATIVESPLICING**—Process by which different exons are included in a processed mRNA.
3. **TRANSCRIPTIONFACTOR**—Protein that can influence the presence or activity of RNA polymerase at a promoter.
5. **EUKARYOTES**—In these organisms, transcription and translation occur in separate compartments.
9. **MRNA**—This molecule codes for a protein and may be regulated at the level of stability.
11. **CAP**—The activator that binds to DNA in the presence of high levels of cAMP.
13. **OPERON**—A group of genes under the control of a single promoter.

