**AP BIOLOGY (WHEATLEY)**

**ALL ABOUT PROTEINS UNIT GUIDE 2015-16**

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| **MONDAY** | **TUESDAY** | **WEDNESDAY** | **THURSDAY** | **FRIDAY** |
| **4/4**  \*History of DNA mini  posters – due at the end  of class | **4/5**  \*Mini-poster jigsaw  \*DNA replication | **4/6**  \*DNA replication | **4/7**  \*DNA vs RNA | **4/8**  \*Transcription POGIL |
| **4/11**  \*Translation POGIL | **4/12**  \*Mutations POGIL | **4/13**  \* Protein synthesis  practice | **4/14**  \*Gene Expression POGIL | **4/15**  **EARLY RELEASE DAY** |
| **4/18**  **SCHOOL HOLIDAY** | **4/19**  \*Biotechnology project | **4/20**  \*Biotechnology project | **4/21**  \*Project presentations | **4/22**  \*Biotechnology lab  simulations |
| **4/24**  \*Biotechnology lab  simulations | **4/25**  **REVIEW FOR TEST** | **4/26**  **ALL ABOUT PROTEINS TEST** |  |  |

Supplemental Resources:

1. Bozeman Science Videos
   1. DNA and RNA Part 1 and 2
   2. DNA replication
   3. Mutations
   4. Epigenetics
   5. Molecular Biology
   6. Nucleic Acids
   7. Gene Regulation
2. Crash Course Videos
   1. DNA structure and Replication
   2. DNA, Hot Pockets, and the longest word ever

Reading: Read Chapters 10, 11, and 12 and answer the prompts below.

A. The Structure of the Genetic Material

10.1 Describe the experiments of Griffith, Hershey, and Chase, which supported the idea that DNA was life’s genetic material.

10.2–10.3 Compare the structures of DNA and RNA.

10.3 Explain how Chargaff’s rules relate to the structure of DNA.

B. DNA Replication

10.4 Explain how the structure of DNA facilitates its replication.

10.5 Describe the process of DNA replication. Describe the mechanisms that correct errors caused by environmental damage or errors from replication.

C. The Flow of Genetic Information from DNA to RNA to Protein

10.6 Describe the locations, reactants, and products of transcription and translation.

10.7–10.8 Explain how the “languages” of DNA and RNA are used to produce   
polypeptides.

10.9 Explain how mRNA is produced using DNA.

10.10 Explain how eukaryotic RNA is processed before leaving the nucleus.

10.11 Relate the structure of tRNA to its functions in the process of translation.

10.12 Describe the structure and function of ribosomes.

10.13 Explain how translation begins.

10.14 Describe the step-by-step process by which amino acids are added to a growing polypeptide chain.

10.15 Diagram the overall process of transcription and translation.

10.16 Describe the major types of mutations, causes of mutations, and potential   
consequences.

D. Control of Gene Expression

11.1 Describe and compare the regulatory mechanisms of the lac operon, trp operon, and operons using activators.

11.2 Explain how selective gene expression yields a variety of cell types in multicellular eukaryotes.

11.2 Explain how DNA is packaged into chromosomes. Explain how packing influences gene expression.

11.2 Explain how a cat’s tortoiseshell coat pattern is formed and why this pattern is only seen in female cats.

11.3 Explain how eukaryotic gene expression is controlled. Compare the eukaryotic gene expression mechanisms to those of prokaryotes.

11.4 Describe the process and significance of alternative DNA splicing.

11.5 Describe the significance of miRNA molecules.

11.6 Explain how mRNA breakdown, initiation of translation, protein activation, and protein breakdown regulate gene expression.

11.7 Explain how the control of gene expression in eukaryotic cells is analogous to the control of water moving through the series of pipes that carry water from a local water supply to a home or business.

11.8 Describe the roles of homeotic genes in development.

11.9 Explain how DNA microarrays can be used to study gene activity and treat   
disease.

11.10 Explain how a signal transduction pathway triggers a specific response inside a target cell.

11.11 Compare the cell-signaling systems of yeast and animal cells.

E. Gene Cloning

12.1 Explain how plasmids are used in gene cloning.

12.2 Explain how restriction enzymes are used to “cut and paste” DNA into   
plasmids.

12.3 Explain how plasmids, phages, and BACs are used to construct genomic   
libraries.

12.4 Explain how a cDNA library is constructed and how it is different from   
genomic libraries constructed using plasmids or phages.

12.5 Explain how a nucleic acid probe can be used to identify a specific gene.

F. Genetically Modified Organisms

12.6 Explain how different organisms are used to mass-produce proteins of human interest.

12.7 Explain how DNA technology has helped to produce insulin, growth hormone, and vaccines.

12.8 Explain how genetically modified (GM) organisms are transforming   
agriculture.

12.9 Describe the risks posed by the creation and culturing of GM organisms and the safeguards that have been developed to minimize these risks.

12.10 Describe the benefits and risks of gene therapy in humans. Discuss the ethical issues that these techniques present.

G. DNA Profiling

12.11 Describe the basic steps of DNA profiling.

12.12 Explain how PCR is used to amplify DNA sequences.

12.13 Explain how gel electrophoresis is used to sort DNA and proteins.

12.14 Explain how short tandem repeats are used in DNA profiling.

12.15 Describe the diverse applications of DNA profiling.

12.16 Explain how restriction fragment analysis is used to detect differences in DNA sequences.

H. Genomics

12.17 Explain why it is important to sequence the genomes of humans and other organisms.

12.18 Describe the structure and possible functions of the noncoding sections of the human genome. Give the current estimate of the total number of human genes. Explain how the complexity of the human organism can result from so few genes.

12.19 Explain how the human genome was mapped.

12.20 Compare the fields of genomics and proteomics.

12.21 Describe the significance of genomics to the study of evolutionary relationships and our understanding of the special characteristics of humans.