Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Mr. Mayer  
Per.\_\_\_\_\_ Honors Biology

***Epigenetics Webquest***

**What is epigenetics?**

Go to <http://learn.genetics.utah.edu/content/epigenetics/>

1. Epigenetics is the study of which chemical reaction?

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**The Epigenome at a Glance**

Click on “The Epigenome at a Glance” and play the video.

1. What are the proteins called that DNA wraps around?

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1. What is the “epigenome” and what does it do?

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1. What do epigenetic tags react to?

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**Gene Control**

Click on “Gene Control” to explore the interactive simulation.

1. The simulation shows you the GFP gene that affects the amount of Green Florescent Protein that is produced. What happens to the appearance of the gene as you turn the knob to the left?

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1. What happens to the appearance of the GFP gene as you turn the knob to the right?

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1. As the gene is coiled tightly, the gene is turned off. What happens to the amount of Green Florescent Proteins as the gene is turned off?

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1. What happens to the amount of Green Florescent Proteins as the gene is turned on?

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1. What is the correlation between the GFP gene, the GFP mRNA, and the Green Florescent Protein production? Continue to use the knob to play with the simulation to write a thorough response to this question.

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1. Click on the information symbol (*i*) next to the word “Histone” in the simulation. What are the histone tails often covered with?

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1. Click on the information symbol (*i*) next to the phrase “Methyl tags.” What do methyl tags most often do?

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1. What is the specific location that methyl tags are added?

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1. Click on the information symbol (*i*) next to the phrase “Acetyl tags.” Where are acetyl tags added to DNA?

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1. Now go back and tinker with the simulation one last time. Explain the correlation between the tightness of the coil and the amount of methyl tags and acetyl tags on the DNA molecule.

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1. Scroll down to “Gene Control and Cancer.” How are the epigenomes of cancer cells difference from epigenomes of normal cells?

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**The Epigenome Learns From Its Experiences**

1. What does each signal do to genes as it nudges a cell toward its final fate?

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1. What do different experiences cause?

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1. What percent of genes are active in a differentiated cell? Explain its importance.

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1. What are the four types of signals discussed?

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1. What are the two functions of Gene Regulatory Proteins?

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**Epigenetics & Inheritance**

1. What is epigenetic inheritance? How does it affect future generations?

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**Genomic Imprinting**

1. How many copies of most genes do we inherit? Where do they come from?

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1. How are imprinted genes different from working copies?

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1. What can improper imprinting result in and lead to?

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1. What is the root of the difficulty with trying to produce a healthy clone?

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1. What is an epimutation?

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**Insight From Identical Twins**

1. If identical twins have the same exact genome, what are any differences caused by?

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**Lick Your Rats**

1. How are highly nurtured rat pups different from rat pups that receive little nurturing?

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1. Click on the interactive simulation “Lick a rat pup!” What does the GR gene do when it is active? What can change the expression of this gene?

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1. Click start to investigate the influence licking a pup has on its epigenome. How is the pup affected by the licking?

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1. Click on “GO!” to Lick another rat pup. Only lick the pup a couple of times (lick it less than last time). How is the pups epigenome different from the last pup you nurtured?

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1. Click on “GO!” to *Investigate the difference high and low nurtured rats*. What part of the brain coordinates the body’s response to stress?

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1. What hormone binds to the GR protein to create a calming effect?

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1. Read the information below the simulation. In what situation would the more anxious rat be more suited for its environment? Why?

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**Nutrition & the Epigenome**

1. What type of diets can rapidly alter gene expression?

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1. What can lead to certain regions of a person’s genome to be under-methylated for life?

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1. How does the agouti gene affect mice?

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1. Researchers studied the nutrition of a small Swedish community. How did the amount of food present for a male in the community eventually affect his grandchildren? Be sure to explain your answer.

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1. The larvae that develop into workers bees and queen bees are genetically identical. How do they develop into completely different individuals?

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**Epigenetics & the Human Brain**

1. Which epigenetic mechanisms have been known to stabilize gene expression?

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