**Biology III – Genetics Final Study Guide**

**Mendelian Genetics Stuff**

What do the Laws of Segregation and Independent Assortment state? How are they different?

Understand the phenomena that don’t fit with Mendel’s *basic* picture of inheritance.

Codominance

Incomplete Dominance

Multiple Alleles

Pleiotropy

Epistasis

Polygenetic Inheritance

Be able to interpret information from single trait and dihybrid Punnet Squares.

**DNA Replication and Protein Biosynthesis Stuff**

*How* do genes become physical traits? Be able to articulate how protein structure and function translate to genetic traits.

What are some different protein types and their functions?

Know the basic process of DNA Replication. Why must DNA be copied in the 5’ 🡪 3’ direction and how is this achieved on the lagging strand? What factors are involved and what are their functions?

Know the processes of Transcription and Translation. What are the components involved and what are their functions?

What are the differences between DNA and RNA, in terms of structure and *functions*? Be able to explain DNA’s antiparallel structure.

Be able to interpret the Genetic Code. What do the amino acids correspond to?

Be able to describe the different types of point and chromosomal mutation. What is a Frameshift Mutation?

**Concepts from Labs**

Drosophila

What were the phenotype ratios observed in the F2 generations? Which traits exemplified dominant/recessive characteristics? Which was sex linked? How/why are sex-linked traits expressed? How does a chi-square analysis work? Be able to complete a chi-square test.

Gel Electrophoresis

What is the purpose of this technique? How are the results from a G.E. experiment read? Be able to interpret results from a gel.

Mushrooms

Describe the connections made between environment and phenotype expressions made with the mushroom experiment. Be able to describe the patterns/relationships that we observed.

ALU

What is a polymorphism (Alu repeat)? How can Alu repeats help us understand evolutionary relationships?

**New Stuff**

Lamarckism

\* Characterize Lamarck’s hypothesis of how evolution works.

Darwinian Evolution

* Characterize Darwin’s Theory of Evolution, how is it different from Lamarck?
* Understand the process of Speciation – Be able to use an example.
  + Founding Population, Separation, alteration of gene pool
  + Adaptive Radiation

Epigenetics

* What is Epigenetics?
* Describe the levels organization within a chromosome, particularly nucleosomes and chromatin.
* How does DNA Methylation work?
  + What is a Methyl group?
  + How do Methyl groups influence gene expression?
* How does Histone modification work?
  + What is an Acetyl group?
  + How are acetylation and methylation different?
* What are some of the implications of Epigenetic research?

* Be able to articulate some of the findings of the latest research in Epigenetics.
  + Licking Rat Pups Study
  + Fat Rat Study
  + Research on Identical Twins

How has Epigenetics shifted our understanding of how inheritance works?