

Study Guide – Exam #1

The first exam is scheduled for **Tuesday, February 28th** & will begin promptly at 6:00 pm. Please bring a blue Scantron (available in the bookstore or Admissions & Records), a #2 pencil and an eraser to class. **NOTE: I will be holding a study session in the classroom from 5:30 – 6:00 p.m. Bring any questions you may have!**

Be prepared to define, OR UNDERSTAND IN CONTEXT, the following terms/concepts:

empirical	natural selection	homozygous
hypothesis	species	heterozygous
adaptation	meiosis	genotype
evolution	gametes	phenotype
selective pressure	gene	dominant
DNA	allele	recessive
punctuated equilibrium	chromosomes	codominance
mitosis	gene flow	genetic drift
mutation	ABO blood groups	theory
reproductive fitness	reproductive isolating mechanism	speciation
epigenome	epigenetics	

- 1) Review the Science and Evolution Vocabulary Sheet (in CANVAS under Additional Resources from Science Evolution Module)
- 2) You should know how scientific explanations are different from non-scientific ones (1/31; Science & Evolution)
- 3) Be able to explain how scientific theories are EMPIRICAL, HISTORICAL, CUMULATIVE, and LIMITED. (1/31 & Nature of Science)
- 4) You should know the scientific definition and use of the term *theory*, and why evolution is considered to be a theory. (1/31; Science & Evolution)
- 5) Be prepared to define “Natural Selection,” that is, what it is, how it works, and why it is an important part of the evolutionary process. For example, if you are given an illustration, you should be able to explain how natural selection is at work in the illustration. (2/7 & handout “Natural Selection in a Nutshell”)
- 6) In the context of natural selection, what does “fitness” mean? (2/7, 2/21 & Natural Selection in a Nutshell)
- 7) Natural selection helps species adapt to changing environments but does this process always lead to the development of an entirely new species? (2/7)
- 8) Is it the individual or the population that evolves? (2/7, Unit Quiz & Natural Selection in a Nutshell)
- 9) How does speciation (the production of new species) occur? (2/7 & 2/21)
- 10) Who discovered the basic laws of inheritance by experimenting with garden pea plants? (2/14; Genetics Cheat Sheet)
- 11) What is an allele? When we say an allele is dominant (or recessive) what does that mean? (2/14; Genetics Cheat Sheet)
- 12) What does *monogenic* mean? (2/14; Genetics Cheat Sheet).
- 13) What does *polygenic* mean? What are some examples of *polygenic* traits in humans? (2/14; Genetics Cheat Sheet)

- 14) Why is the process of **meiosis** important to the production of variation? (2/14 & Genetics cheat sheet)
- 15) What is the term used to refer to individuals who carry different alleles for a specific trait? How about those who carry the same alleles? (I am not asking about dominant vs. recessive, I'm asking about the combination of alleles in the genotype) – (2/14, Genetics cheat sheet & Practice Solving Genetics Problems worksheets)
- 16) We discussed the example of peppered moths in class (2/7 & 2/21). You should be able to discuss/explain how the moth example demonstrates the following: the role of variation, the inheritance of adaptive/maladaptive traits, the role of the environment (selective pressure), natural selection and evolution.
- 17) What are the major forces of evolution (the main processes of evolution)? You should be able to define them and understand how they produce, maintain and/or redistribute variation in a population. (2/21; Reading – “Genes in Populations” & 2/21 Video “Accidents of Creation”)
- 18) Know the difference between gene flow and genetic drift. (2/21 & Genes in Populations Reading)
- 19) Why are mutations so significant for evolutionary change? (2/21 & Video “Accidents of Creation”; Genes in Populations Reading & Video Guide – Got Lactase?)
- 20) Are the affects of mutations good, bad or neutral? (2/21; Video “Accidents of Creation” & Video Guide – Got Lactase?)
- 21) The influence of the environment on gene expression and gene function is better understood due to this field of study and part of the genome (2/14 & Epigenetics Readings & website readings)
- 22) What is a reproductive isolating mechanism and what role does it play in speciation? (2/21; class handout – Reproductive Isolating Mechanisms. NOTE: You do NOT need to know the specific pre-mating and post-mating isolating mechanisms from the handout).
- 23) What were the reproductive isolating mechanisms that prevented Galapagos finches from interbreeding? (2/7; Video: Beak of the Finch)
- 24) You should know the difference between gradualism (the model of evolution by natural selection proposed by Darwin) and *punctuated equilibrium*. (2/21)
- 25) You should be able to solve simple genetics problems **similar to those on the Practice sheets** found on the webpage/CANVAS. For example, given information about blood types or other characteristics including which allele is dominant or recessive, you should be able to determine the *genotype* and then use the information provided for two individuals in a Punnett square to determine genotypic and phenotypic outcomes.

From the readings: Review all of your notes from the reading guides but pay special attention to the following:

1. Identify and describe the “*selective pressures*” that have been placed on commercial honeybee colonies and their impact on the honeybee populations. (2/7 class discussion)
2. What do the commercial honeybees, coffee and the Hawaiian state bird (the gne gne – from 2/21 video Accidents of Creation) have in common? (2/7 & 2/21 class discussions)
3. In what part of the world did the BRCA-1 gene originate and what evolutionary processes played a part in its spread across the world? (2/21 class discussion)
4. The Ashkenazim and other orthodox Jews marry *endogamously*, meaning other orthodox Jews. How does this explain the prevalence of the BRCA-1 genes in the Jewish populations of North America based on what you’ve learned about genetic drift and the founder effect? (2/21 class discussion & reading guide)
4. Why are orthodox rabbis supporting genetic testing and counseling for couples who are considering marriage? (2/21 class discussion)