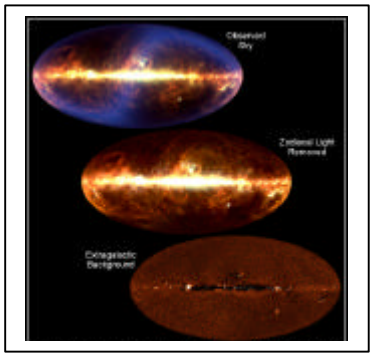
I. Short Answer Questions DO ALL OF THEM, PLEASE

SAQ #1. According to the syllabus, what are the 4 major objectives of the course? (Please list AND briefly explain each one in about 5-10 words)

SAQ #2. Please briefly describe ONE specific line of evidence that astronomers use to support the "Big Bang" Theory. (one hint: remember the photo below?)



SAQ #3. Please explain how it is that despite Europa's small size and vast distance to the sun, there could possibly be liquid water there? Explain what is the heat source that could be melting Europa's ice? Feel free to use a diagram.

SAQ #4. What are the pros and cons of the hypothesis that the life first evolved at or very near to the Earth's surface?

SAQ #5. **CHOOSE ONE of the two questions on this page** and answer it below in the space provided. A short answer is sufficient, however, you must use a sketch and supporting details to illustrate your answer.

(A) Please briefly outline the key steps that may have led to the evolution of photosynthesis from heterotrophic bacterial ancestors.

(B) Please briefly outline the key steps that may have led to the evolution of aerobic respiration.

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which Q are you answering ? _____ (HINT: you are welcome to draw inspiration from the figures on the next page, however, make sure you answer either (A) or (B) from this page.)

SAQ #6. What are the key assumptions that, if true, would lead a population to Hardy Weinberg equilibrium in one generation? Please list and briefly explain 5 totally different assumptions.

SAQ #7. Please explain the three conditions that are required for evolution to occur by Natural Selection.

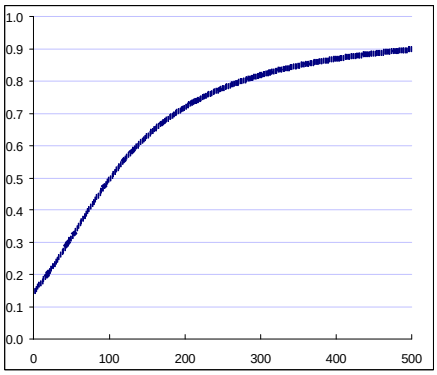
SAQ #8. Please briefly define meiotic drive, and explain why it is so rarely observed in natural populations.

SAQ #9. What are reproductive isolating mechanisms (RIMs) and why are they important for speciation? Give an example of at least one prezygotic and one postzygotic RIM in your answer.

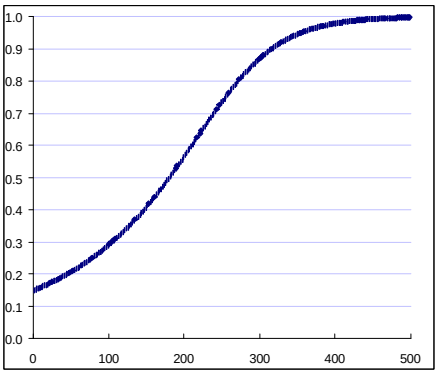
SAQ #10. What is the relationship of macroevolution to microevolution, as stated by the Modern Synthesis? Why does the concept of "punctuated equilibrium" challenge this relationship?

SAQ #11. Consider the two cases for directional selection at right:

w0	w1	w2
1	1	0.95



w0	w1	w2
1	0.96	0.95



Why does evolution lead to fixation of "A" much sooner in the case at right?

SAQ #12. Please briefly explain is coevolution a micro- or macro-evolutionary process? WHY?

Part II. Longer Answer Questions (15 points each). Please do both questions.

LAQ #1. PART A: What is a phylogenetic tree and what is the principle under which one is constructed?

PART B: What is homology and how is the determination of the homology or non-homology of a given trait critical to making a phylogenetic tree?

PART C: Contrast the differences between a traditional vs. phylogenetic classification system that results from a phylogenetic tree (for instance, what are sister taxa?). How do the two types of classification differ in terms of the basic species groups and in the formation of higher taxa?

LAQ #2. This question will assess your understanding of "chance" in evolution and challenge you to integrate information from several different lectures.

Chance is considered by some to play an important role in macroevolution. Address the possible roles of chance in evolution during both (a) speciation (10 pts) and (b) extinction / adaptive radiation events (10 pts).

(a) speciation (10 pts)

(b) extinction / adaptive radiation events (10 pts).