Lab #13: *Genetics 2* (Chapter 8)

Mitochondrial-DNA

INTRODUCTION:

The objective of this lab is to help the student to understand how mitochondrial-DNA is used to learn about the past and to illustrate how the predictions of the biblical Creation model are verified by the mitochondrial-DNA, while Evolution is falsified by the evidence.

MATERIALS

- Calculator

METHODS

1. Calculate a range of four predicted genetic variation amounts (V) that should exist in mitochondrial-DNA today if modern humans emerged (evolved) 180,000 years ago, assuming a mutation rate (r) of .15 or 0.3 per generation and a generation length (g) of 15 or 35 years. Record your calculations in the tables to the right.

$$V = r \times N_g$$

N_g: the number of generations
V: the # of genetic variations or differences in two mitochondrial-DNA sequences that occur in N_g generations
r: the average rate of mutations or variations that occur in a single generation

$$N_g = \frac{E}{g}$$

E: the # of years that genetic variations have been accumulating (180,000 years for Evolution; 4,400 years for Creation)
g: the # of years in a single generation

Variation Amounts (V) in Mito-DNA when E = 180,000 years ago

	r = 0.15 (mut./gen.)	r = 0.3 (mut./gen.)
g = 15 (years)		
g = 35 (years)		

2. Calculate a separate range of four predicted genetic variation amounts that should exist in mitochondrial-DNA today if modern humans emerged 4,400 years ago, assuming the same mutation rate range and generation length range.

Variation Amounts (V) in Mito-DNA when E = 4,400 years ago

	r = 0.15 (mut./gen.)	r = 0.3 (mut./gen.)
g = 15 (years)		
g = 35 (years)		

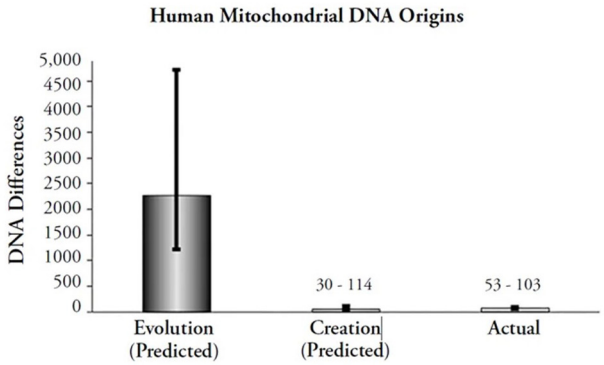
3. Given that V = 78 and r = 0.158 (values based on empirical evidence), calculate how many generations (N_g) there should be between "mitochondrial Eve" and modern humans. Calculate how long each generation would have to be (g) in order for the observable scientific evidence to fit the predictions of Evolution (namely, E = 180,000).
N_g = _____ g = _____

RESULTS

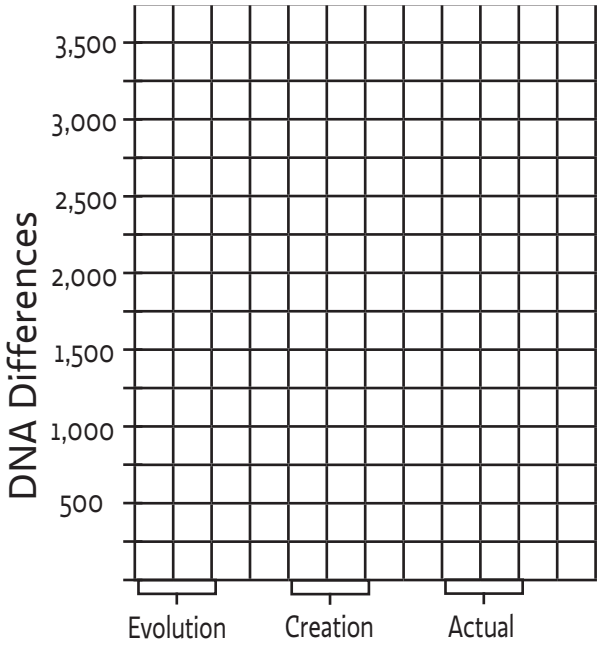
1. Determine the predicted Variation Amount (V) for Evolution and Creation given the more empirically accurate 0.158 mutation rate and 15 year generation length. V_E = _____ V_C = _____

2. Use a column graph (see example below) to display your results, with 3 bars representing Evolution Prediction, Creation Prediction, and Actual Variation. The height of each bar will be determined by the results from Results question #1.

   - A confidence interval (the black "I" bars over the columns below) should be drawn over each column with the two extreme values (highest and lowest values) taken from the tables on the previous page.
   - The Actual Variation (*V*) is 78, with a confidence interval ranging from 53-103.
   - See the following graph for an example (note that your values and labels will be different).



_V_ Prediction Comparisons for Evolution, Creation, and Actual Values



CONCLUSIONS/DISCUSSION

1. In the equation used to determine Variations (*V*, under Methods, #1), other than "*E*," what are the two major underlying assumptions which, if incorrect, could significantly affect your results? _____
   _____
2. Are your assumptions reasonable from a Creation perspective? Why or why not? _____
   _____
   _____
3. Clearly, the actual variation is orders of magnitude different from the predictions of Evolution. Is the generation length that would be required to reconcile the difference acceptable? If not, why not? [Hint: See your work on #3 of methods.] _____
   _____
4. In order to reconcile the evidence with evolutionary predictions in a reasonable way, what would evolutionists have to argue (concerning *r*)? _____
   _____
5. Why does that conclusion by evolutionists present another major problem for Evolution/old Earth paradigms? _____
   _____
   _____