

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
- Graph paper

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.

$$V = r \times N_g$$

V : the # of genetic variations or differences in two mitochondrial-DNA sequences that occur in N_g generations
 r : the 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

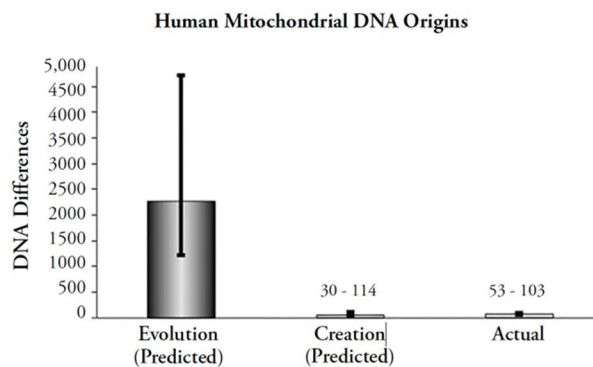
2. Calculate a separate range of four predicted genetic variation amounts that should exist in mitochondrial-DNA today if modern humans emerged 4,400 years ago, assuming the same mutation rate range and generation length range.
3. Given that $V = 78$ and $r = 0.158$, calculate how many generations (N_g) 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.

RESULTS

1. Display the range calculations for the Evolution and Creation mitochondrial-DNA variance calculations (numbers 1-2 in Methods) in a table.
 - Row 1: Evolution ($E = 180,000$ years ago)



- Row 2: Creation ($E = 4,400$ years ago)
 - Column 1: $r = 0.15$; $g = 15$
 - Column 2: $r = 0.15$, $g = 35$
 - Column 3: $r = 0.3$, $g = 15$
 - Column 4: $r = 0.3$; $g = 35$
2. Add a 5th column in the table representing the more precise predictions for Evolution and Creation, using a calculated 0.158 mutation rate and 15 year generation length for both.
 3. Use a column graph to display the results from the table, with 3 bars representing Evolution Prediction, Creation Prediction, and Actual Variation. The height of each bar will be determined by the results of column 5 in the table.
 - A confidence interval should be drawn over each column with the two extreme values (highest and lowest values) for each row of the table.
 - The Y-axis label should be “DNA Differences,” and the X-axis labels (one for each column) should be Evolution Prediction, Creation Prediction, and Actual Variation.
 - 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).



CONCLUSIONS/DISCUSSION

1. In the equation used to determine Variations (V , under Methods, #1), 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?
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?

