Lab #12: *Genetics 1* (Chapter 8)

Punnett Squares

INTRODUCTION:

The objective of this lab is to help the student to understand how the physical variety found among humans could have emerged from a single pair of humans.

MATERIALS

- Graph paper
- Colored pencils (black, dark brown, brown, and tan)

METHODS

1. The Punnett Square given in the text (Chapter 8) is an example of a heterozygous (AaBb)-heterozygous (AaBb) dihybrid cross (simplified to conceptualize the origin of skin color). Calculate the 16 possible variations for a heterozygous (AaBb)-homozygous/dominant (AABB) dihybrid cross, placing the results in a table. The column and row headings of the table, respectively, will be the four possible combinations that could result from the four letters being crossed (e.g., for the heterozygous individual, the headings would be AB, Ab, aB, and ab).
2. Calculate the 16 possible variations for a heterozygous (AaBb)-homozygous/recessive (aabb) dihybrid cross, placing the results in a table. Again, the column and row headings of the table, respectively, will be the four possible combinations that could result from the four letters being crossed.
3. Calculate the 16 possible variations for a homozygous/dominant (AABB)-homozygous/recessive (aabb) dihybrid cross, placing the results in a table. Again, the column and row headings of the table, respectively, will be the four possible combinations that could result from the four letters being crossed.
4. Calculate the 16 possible variations for a homozygous/dominant (AABB)-homozygous/dominant (AABB) dihybrid cross, placing the results in a table. Again, the column and row headings of the table, respectively, will be the four possible combinations that could result from the four letters being crossed.
5. Calculate the 16 possible variations for a homozygous/recessive (aabb)-homozygous/recessive (aabb) dihybrid cross, placing the results in a table. Again, the column and row headings of the table, respectively, will be the four possible combinations that could result from the four letters being crossed.

RESULTS

1. Draw and color Punnett Squares for your calculations of all five dihybrid crosses, showing possible resultant skin colors. Use the color scheme illustrated in the Punnett Square in Chapter 8 of the text (i.e., 4 dominant letters equates to black, 3 dominant letters equates to dark brown, 2 dominant letters equates

to brown, one dominant letter equates to light brown, and no dominant letters equates to white).

2. What are the statistical likelihoods that a person's offspring would be extremely light, extremely dark, or somewhere in between for each dihybrid cross?
3. What would the second generation's children look like after a first generation homozygous/dominant-homozygous/recessive dihybrid cross?

CONCLUSIONS/DISCUSSION

1. Why is it reasonable to postulate that Adam and Eve were a Heterozygous couple?
2. Is there another possibility for what kind of couple Adam and Eve could have been, in order to bring about the variety we see on Earth today?
3. If Adam and Eve were that type of couple, what might that imply about their respective appearances?
4. In your mind, apply your Punnett results to other physical characteristics besides skin. What other varieties would be expected in physical characteristics due to heterozygous dihybrid crosses in other areas of the genome? Be specific, listing several examples of physical characteristics that could each have a spectrum of variety.