Lab #13: *Genetics 1* (Chapter 8)

Punnett Squares

Punnett Square Showing Potential **Skin Tones** for a Heterozygous (AaBb-AaBb) Couple

	AB	Ab	aB	ab
AB	AA BB	AA Bb	Aa BB	Aa Bb
Ab	AA Bb	AA bb	Aa Bb	Aa bb
aB	Aa BB	Aa Bb	aa BB	aa Bb
ab	Aa Bb	Aa bb	aa Bb	aa bb

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 and shown above) 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 the table on the next page. 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 the corresponding table on the next page. 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 the corresponding table on the next page. 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 the corresponding table on the next page. 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 the corresponding table on p. 3. 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.

Heterozygous (AaBb)–Homozygous/dominant (AABB) Dihybrid Cross

Heterozygous (AaBb)–Homozygous/recessive (aabb) Dihybrid Cross

Homozygous/dominant (AABB)–Homozygous/recessive (aabb) Dihybrid Cross

Homozygous/dominant (AABB)–Homozygous/dominant (AABB) Dihybrid Cross

RESULTS

1. Color your 5 Punnett Squares, 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? Use the chart below for your answers.

Homozygous/recessive (aabb)–Homozygous/recessive (aabb) Dihybrid Cross

Statistical Likelihoods of Various Breeded Skin Colors

	Black	Dark Brown	Brown	Light Brown	White
AaBb-AABB					
AaBb-aabb					
AABB-aabb					
AABB-AABB					
aabb-aabb					

3. What would the second generation's **children's** (i.e., the 3rd generation's) skin color 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 genetically, in order to bring about the same level of variety in two generations instead of one? [Hint: what other genetic cross would create all heterozygous children?] _____
_____
_____

3. If Adam and Eve were **that** type of couple, what would that imply about Adam and Eve's respective skin colors? _____
_____
_____

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. _____
_____
_____
_____