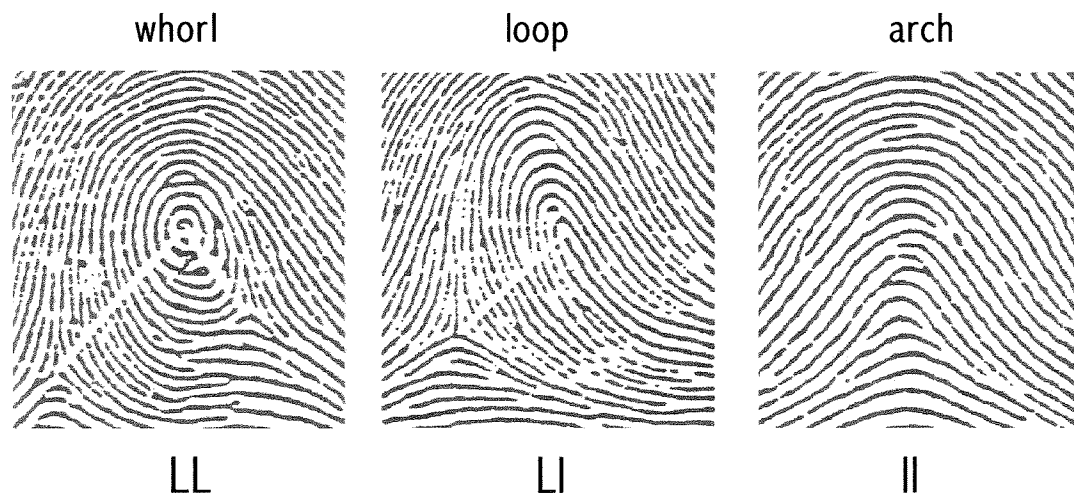


Fingerprints and Incomplete Dominance

BACKGROUND: Every person has their own unique pattern of fingerprints, and this fact has long been used by police in identifying suspects. However, all patterns fit into one of three main types: whorl, loop or arch. Even though there is an endless number of variations within these three pattern types every individual can still be placed into one of these three major groups.

The three major fingerprint groups represent a classic example of incomplete dominance. In these situations, since neither gene is dominant, an intermediate effect is produced in the hybrid. It should be understood that this effect is not produced by a “blending of the genes” since further crosses of these intermediate hybrids will produce offspring showing the original parental types. This situation is shown in the diagram below:



PURPOSE: The purpose of this lab is to investigate the ‘workings’ of incomplete dominance by studying fingerprints and how they are genetically expressed.

MATERIALS:

- Pencils and a sharpener
- 3x5 inch index card
- Transparent tape; $\frac{3}{4}$ inch is better than $\frac{1}{2}$ inch
- Good lighting
- Hand magnifiers— nice but not essential

PROCEDURE:

1. Prepare a scotch tape fingerprint of your index finger by following the following steps:
 - a. Rub a #2 pencil over the central part of an index card until it is covered with graphite (*this will be your ‘ink’ pad*)
 - b. Rub the pad of your index finger on the graphite
 - c. Place a strip of scotch tape on the finger pad (sticky side facing the skin). When you remove the tape your fingerprint outline will remain on the tape

- Place the tape with your fingerprint in the data table #1 below.
- Fill in the information concerning your fingerprint (*phenotype, genotype, fingerprint pattern*) in data table #1 (*you may want to use a magnifying glass to help you see your print*)
- Obtain examples of the remaining two types of fingerprint patterns from yourself or someone else in your class. (*this may take a little searching*) Place their prints in the appropriate places in data table #1 and complete the data table.

DATA TABLE #1

	FINGERPRINT (place tape here)	GENOTYPE	PHENOTYPE (pattern type)
YOUR FINGERPRINT			
PRINT #2			
PRINT #3			

5. Obtain prints from all five of your finger and one toe (if possible). Place them in data table #2 and fill in information about prints.

6. When completed answer questions 1 through 10

DATA TABLE #2

	FINGERPRINT (place tape here)	GENOTYPE	PHENOTYPE (fingerprint pattern)
INDEX FINGER			
SECOND FINGER			
THIRD FINGER			
FOURTH FINGER			
THUMB			
TOE			

QUESTIONS:

1. Which of the three fingerprint patterns represents the:

(a). *Homozygous dominant*-

(b). *Homozygous recessive*-

(c). *Heterozygous*-

2. Which print pattern is a result of *incomplete dominance*?

3. If fingerprints were a result of *complete dominance* what would be the only two fingerprint groups?

4. Using your textbook as reference, describe one other example of *incomplete dominance* found in nature.

Example-

Describe the *phenotype* (appearance) of the:

(a). *Homozygous dominant form*-

(b). *Heterozygous form*-

(c). *Homozygous recessive form*-

5. Which fingerprint pattern did your index finger exhibit?

6. According to data table #2, did all of your fingers have the same type of pattern? If not which patterns were seen.

7. What pattern did you find on your toe? Do you think all of your toes have the same pattern?

8. Do you think that your right and left index fingers have the same type of pattern? Why or why not.
(*check them and find out!*)

9. What pattern seemed to be most common in your class? What is the *genotype* of this pattern?

10. What do you think the purpose of fingerprints are.