



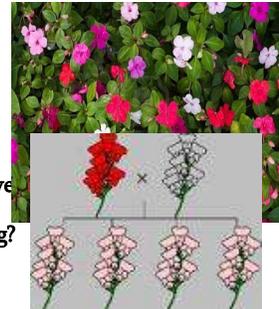
## Extending Mendelian Genetics

### Chapter 12



## Think about this...

- You are walking around outside and you notice a bush with two distinctly colored flowers: red and white. However, you notice a pink flower here and there. Is this possible considering what you have just learned? If not, what do you think is happening?



## Beyond Mendel

- Mendel's discoveries obviously did not work in this case and in many others.
- Mendel's work focused on traits that were "either/ or" traits-- they would be round or wrinkled, red or white. He didn't focus on anything that didn't follow such a pattern.



Is this a wrinkled or round seed?

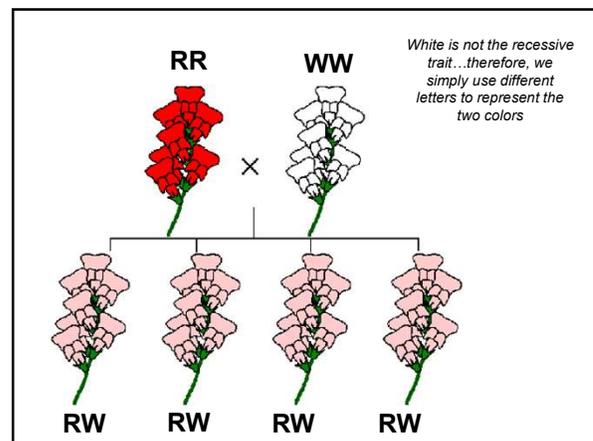


## Beyond Mendel

- Mendel's work did, however, provide a *basis* for discovering the passing of traits in other ways including:
  - Incomplete Dominance
  - Codominance
  - ~~Polygenic Traits~~
  - ~~Sex-Linked Traits~~

## Incomplete Dominance

- Incomplete Dominance** is when one allele is not completely dominant over the other. Thus, the heterozygous phenotype is a **blend** of the effects of the two alleles.
- The pink flower is a common example of incomplete dominance.



### Punnett Squares and Incomplete Dominance

- In snapdragons, when crossing a red flower(RR) with a white flower(WW), a pink flower(RW) can be produced. The alleles that control this trait in snapdragons are *incompletely dominant*.

**Cross a pink snapdragon with a red snapdragon to find the probable genotypes and phenotypes. Use “R” for the red allele and “W” for the white allele.**

### Codominance

- **Codominance** is when both alleles contribute to the resulting phenotype.
- For example, some chickens have both black and white feathers.



### Other Codominance Examples



### Punnett Squares and Codominance

- In chickens, crossing a black feathered chicken with a white feathered chicken can result in black and white speckled chicken.

**Cross a black feathered chicken with a white feathered chicken to find the probable genotypes and phenotypes. Label the allele for black feathers as (B) and the allele for white feathers as (W).**

## Multiple Alleles



- **Multiple alleles** indicate that there may be more than two possible alleles for a certain trait in a population.
- Coat color in rabbits is an example
- Blood Type in humans is another example

## Multiple Alleles and Blood Typing

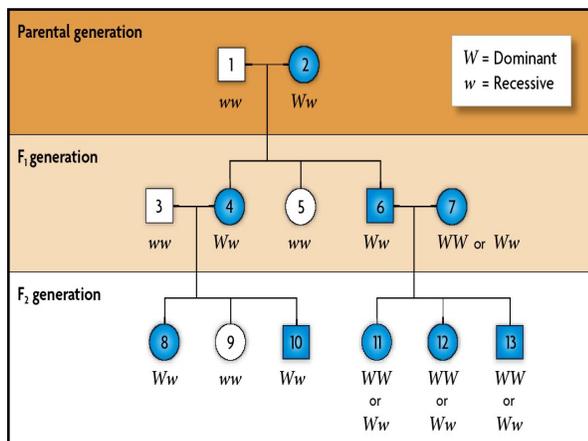
- What is blood-typing?
  - Determining what blood type you are.
  - Depends on the presence or absence of specific proteins (antigens) on your red blood cells.
- Governed by **multiple alleles**.
  - More than two alleles exist for blood types. (A, B & O)
- Human blood types:
  - A, B, AB, or O
  - A and B are both dominant alleles; this is also an example of **codominance**.
  - O = recessive allele.

## Chart of Blood Types

PHENOTYPE (BLOOD TYPE)		GENOTYPES
A	antigen A 	$I^A I^A$ or $I^A i$
B	 antigen B	$I^B I^B$ or $I^B i$
AB	both antigens  <b>Universal Receiver</b>	$I^A I^B$
O	no antigens  <b>Universal Donor</b>	$ii$

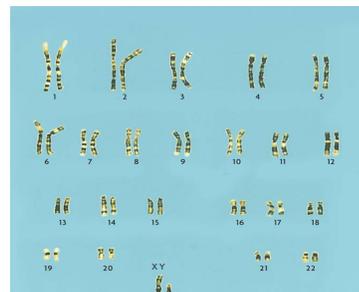
## Pedigrees

- A pedigree chart is used to trace the phenotypes and genotypes throughout a family.
- Boxes = males  
Circles = females
- Shaded shape = person shows the trait  
White shape = person doesn't show trait  
Half-shaded = person is a carrier



## Karyotypes

- A karyotype is a picture of all the chromosomes in a cell.



- Karyotypes can show changes in chromosomes.
  - deletion or loss of chromosome
  - extra chromosomes or duplication of part of a chromosome

