Non-Mendelian Genetics

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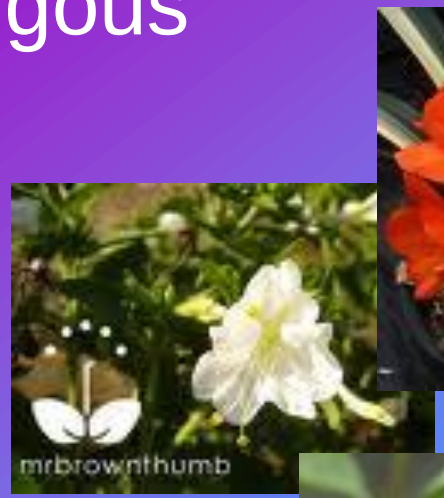
- Some traits don’t follow the simple dominant/recessive rules that Mendel first applied to genetics.
- Traits can be controlled by more than one gene.
- Some alleles are neither dominant nor recessive.

Incomplete Dominance

- One allele is not completely dominant over another.
- The heterozygous phenotype is a **blending** of the two homozygous phenotypes.

Example: four o'clock flowers

- rr=red
- ww=white
- rw=pink (blending of the two alleles)



Codominance

- Two alleles are both expressed as a dominant phenotype
- Coat color in cows
  - RR: Red
  - WW: White
  - RW: Roan, white with red spots (NOT pink!)

Multiple-Allele

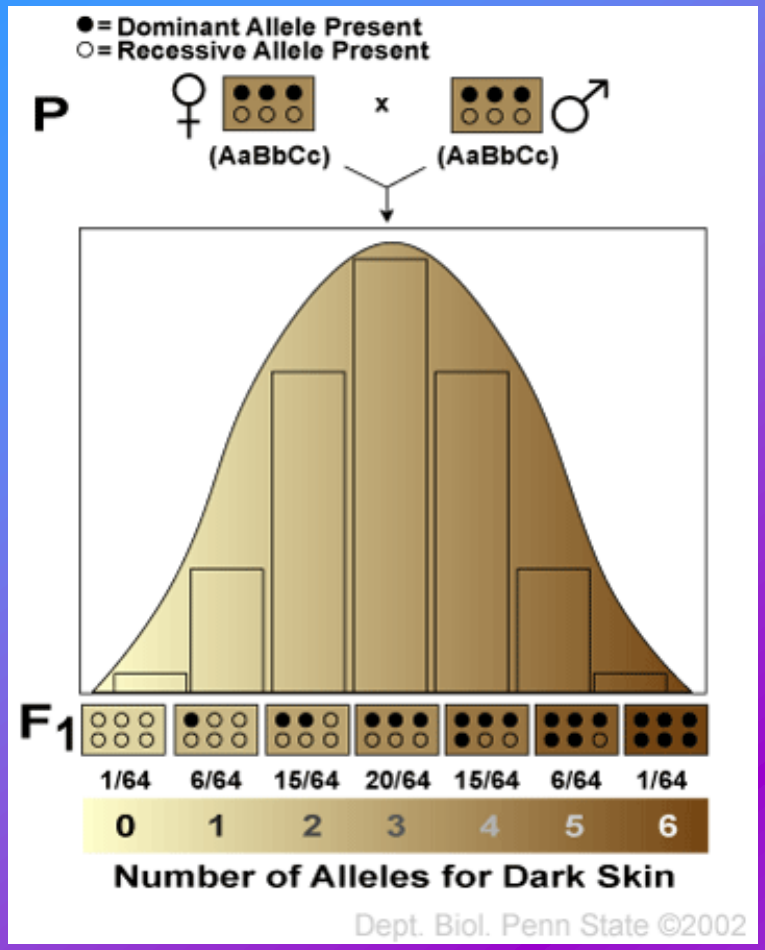
- More than one allele controls a trait

- Ex. Blood type
  - A, B, or O (I^A, I^B, i)
  - A and B are co-dominant and both are dominant to O

Phenotype (blood type)	Genotype
A	A A or A O
B	B B or B O
AB	A B
O	O O

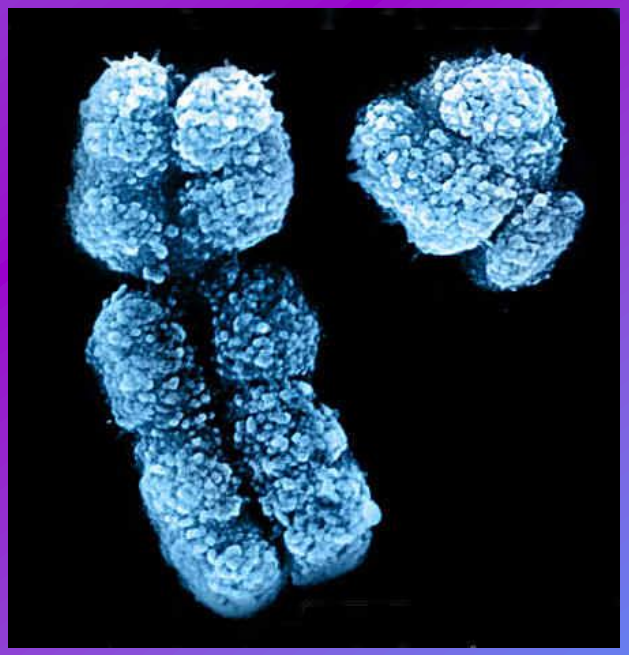
Polygenic Inheritance

- **Polygenic inheritance**—trait controlled by more than one gene
  - Ex skin color—additive effects of up to 6 genes—each gene determines amount of melanin produced
  - Eye color


●= Dominant Allele Present
○= Recessive Allele Present
P
(AaBbCc)
x
(AaBbCc)
F1
1/64
6/64
15/64
20/64
15/64
6/64
1/64
0
1
2
3
4
5
6
Number of Alleles for Dark Skin
Dept. Biol. Penn State ©2002

Sex-Linked Inheritance

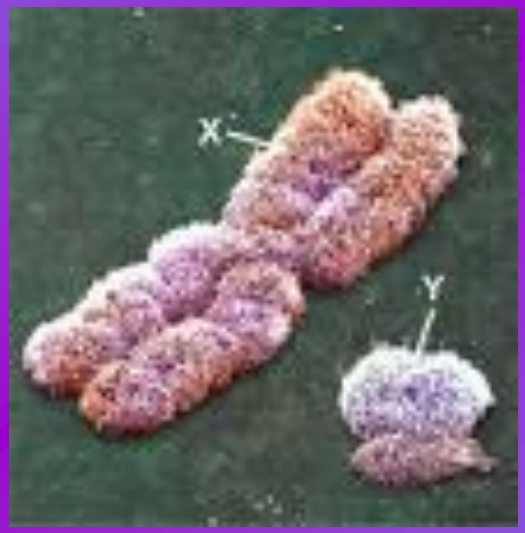
Review



- Males have an X and a Y chromosome
- Females have two X chromosomes

- These chromosomes determine sex, so genes located on these chromosomes are known as sex-linked genes.

- The X chromosome is much larger than the Y, so it carries more genes than the Y chromosome.



•Disorders that are sex-linked are much more common in **males**, because they would only need **1 recessive allele** to have the trait; rather than the **two recessive alleles the females need.**

Ex. Colorblindness, hemophilia

Carried on X chromosome—all males inherit the disorder, females only have it if get both recessive X chromosomes