

Complex Patterns of Inheritance

Incomplete Dominance

- Not all alleles are dominant and recessive like the ones Mendel studied in his pea plants. Some alleles are equally strong and neither are masked by the other.
- When both alleles are present, they are both expressed in the phenotype. The hybrid (heterozygote) is a blend of both alleles.

Incomplete Dominance

RR=Red

WW=White

RW=Pink

(mix)

Incomplete Dominance



	R	R
W	 RW	 RW
W	 RW	 RW

Codominant

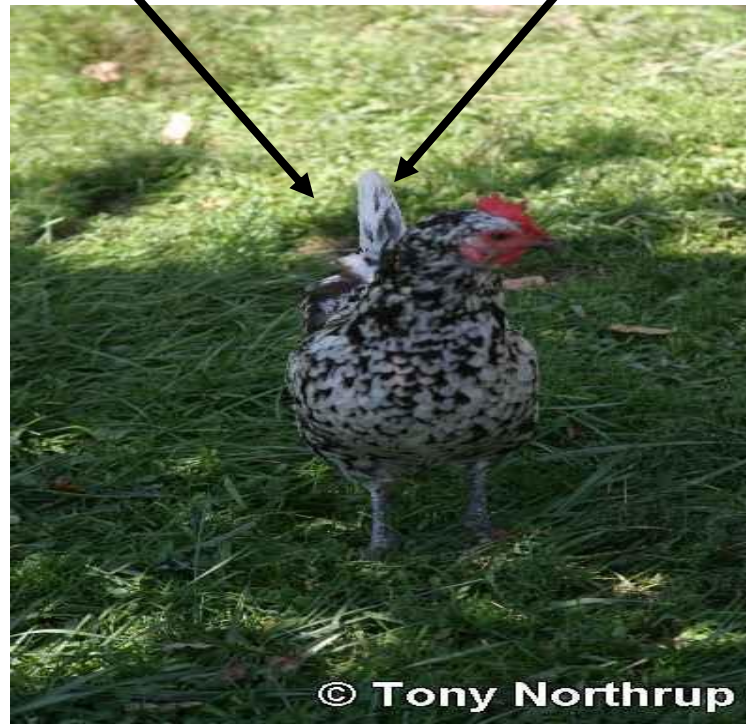
- Co-dominance, is a situation in which both alleles are **equally** strong and both alleles are visible in the heterozygous genotype.

CODOMINANCE

EX.



BB=Black
WW=White
BW= black AND
white



Co-Dominance

- Co-Dominance is a little more tricky.
- In Co-Dominance, multiple traits can be dominant.
- For example, in livestock and horses, a unique color called “Roan” exists.
- Roan looks pink, but it is NOT pink – Roan is a blend of red and white hair.



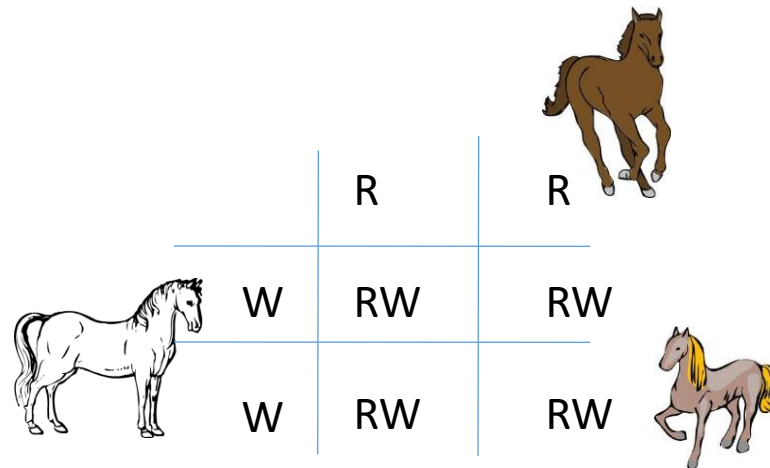
Roan – Red AND White

- A close-up of a roan animal's coat shows that the hair is not pink – it is BOTH red and white.



Co-Dominance and Punnett Squares

- Because both traits are dominant, both need to be capitalized.
- Because both need to be capitalized, we need two different letters to show co-dominance.



Sex-linked Traits

- There are 22 pairs of chromosomes in your body that are called **autosomes**.
- The other pair are called **sex chromosomes**. They are called “X” and “Y”.
- Female genotype = XX
- Male genotype = XY

What are Sex Linked Traits?

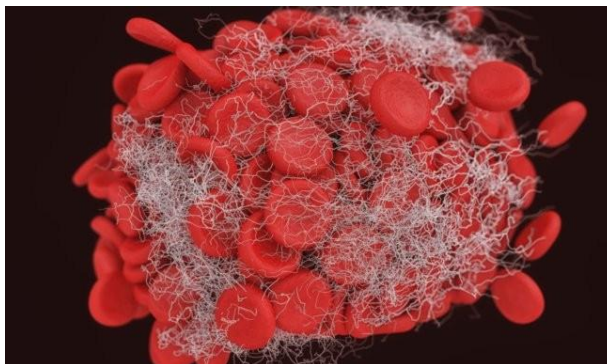
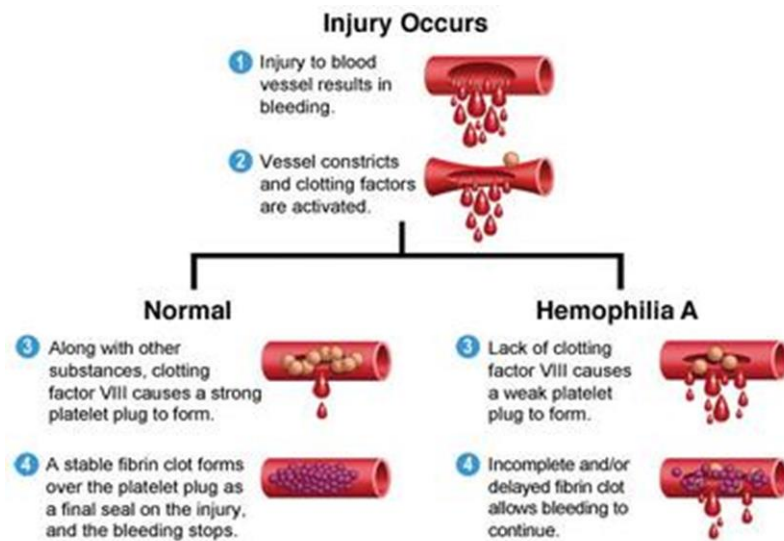
- In 1910, Thomas Morgan discovered traits linked to sex chromosomes in fruit flies.
- Some genes are attached to the X and Y chromosomes
- **EXAMPLE:** In humans, colorblindness and baldness are found on the X chromosomes

Punnett Square for Color Blindness

	x^B	x^b
x^B	x^Bx^B	x^Bx^b
Y	x^BY	x^bY

B = Normal
b = Color Blind

Hemophilia



- This disease is a **Recessive sex-linked** trait causes a particular protein (Clotting factor VIII) not to form. Because of this missing clotting factor, individuals with hemophilia bleed longer than other people because they don't have the proper clotting factor.
- Some people will have more severe bleeds than others. Scientists have produced engineered clotting factors that hemophiliacs can take to help their blood clot properly. Some people receive the missing protein from plasma donors.
- Show the Punnett square of a female who is heterozygous mating with a male who has Hemophilia. What proportion of their male and female offspring would have Hemophilia?

Polygenic Inheritance

- - the inheritance pattern of a trait that is controlled by two or more genes.
 - Examples in humans include
 - hair color (AABBCC), eye color, & skin color

