CONCEPT: SEX-LINKED GENES

● Humans have two sex chromosomes, X and Y

□ The Y chromosome has certain characteristics

- The Y chromosome contains only a few dozen genes

- **SRY gene** determines maleness

- It is **hemizygous** because there is only one Y chromosome

□ The X chromosome, unlike the Y, contains hundreds of genes for multiple non-sexual functions

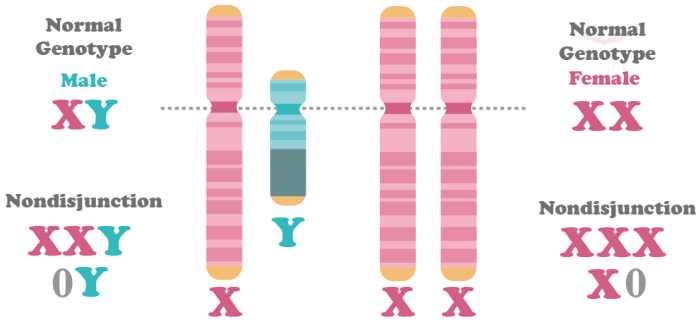
- Both the X and Y have **pseudoautosomal regions 1 and 2**, which help pair the X and Y together

- During meiosis, the X and Y act as a pair, so that they can segregate equally into sperm

- **Nondisjunction** occurs when chromosomes fail to separate properly

- XXX, XXY, XO, OY

EXAMPLE:



□ **Sex-linkage** is when genes located on the sex chromosomes show certain inheritance patterns

- **X-linkage** is when there are mutant alleles on the X chromosome

- **Y-linkage** is when there are mutant alleles on the Y chromosome

- **Sex-limited inheritance** is when expression of a phenotype is absolutely limited to one sex

- Example: Different coloration or size in males/females

- **Sex-influenced inheritance** is when the sex of an individual influences the expression of a phenotype

- Gene expression is dependent on male/female hormones

- Example: Pattern Baldness

EXAMPLE: X-Linkage and eye colors in *Drosophila*

P

Red-eyed female
w^+/w^+

X

White-eyed male
w/y

F_1

Cross F_1 males and females

Red-eyed females/males
w^+/w or w^+/y

F_2

Red-eyed males/females
3/4

White-eyed males
1/4

EXAMPLE: X-linkage and eye colors in *Drosophila* - reciprocal cross

P

Red-eyed male
w^+/y

X

White-eyed female
w/w

F_1

Red-eyed Females
w^+/w
1/2

White-eyed males
w/y
1/2

F_2

Red-eyed females/males
w^+/w or w^+/y
1/2

White-eyed females/males
w/w or w/y
1/2