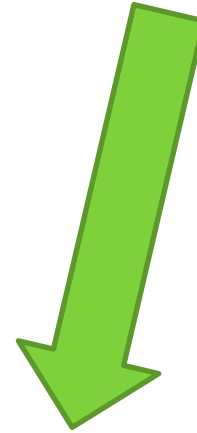




# Intro to Genetics

# Why do you look like that?

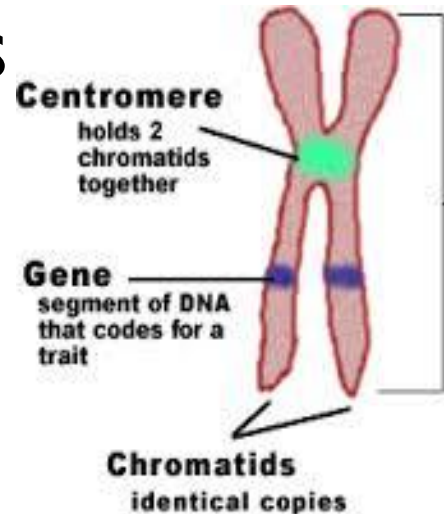
**Genetics** = Study of Heredity



Passing of genes or traits  
from parent to offspring

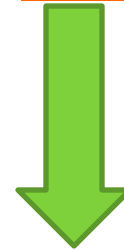
# Genes

- Segments of DNA on chromosomes that determine specific traits
- Two forms of every gene!
  - Called alleles
  - Represented by capital or lowercase letters
    - Ex: H or h (same letter, different form)



# Traits

- Inherited Characteristics
- Observable Traits = Phenotype



Physical

Characteristics

Ex: Hair color, eye color, freckles,  
dimples, right-handed

# Traits Continued

- **Dominant Trait** = will always be seen when a copy of the trait is present
  - Represented by capital letter
  - **Ex:** Right-handed (R)
- **Recessive Trait** = hidden when the dominant trait is present
  - Represented by lower case letter
  - **Ex:** Left-Handed (r)

# Genotypes

- The genes that are present in an individual
  - Represented by 2 letters!
- Homozygous: 2 of the same alleles or genes
  - Homozygous dominant: 2 dominant alleles
    - Ex: RR
  - Homozygous Recessive: 2 recessive alleles
    - Ex: rr
- Heterozygous: 2 alleles that are opposite
  - One dominant and one recessive
    - Ex: Rr

# Gregor Mendel

- Austrian Monk who studied genetics in pea plants



*Traits that Mendel observed:*



**Table 11.1 Pea-Plant Characters Studied by Mendel**

| Character studied | Dominant trait                                                                                  | Recessive trait                                                                                  |
|-------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Seed shape        | smooth<br>     | wrinkled<br>  |
| Seed color        | yellow<br>     | green<br>     |
| Pod shape         | inflated<br> | wrinkled<br> |
| Pod color         | green<br>   | yellow<br>  |

Flower color

purple



white



Flower position

on stem



at tip



Stem length

tall



dwarf



# Mendel

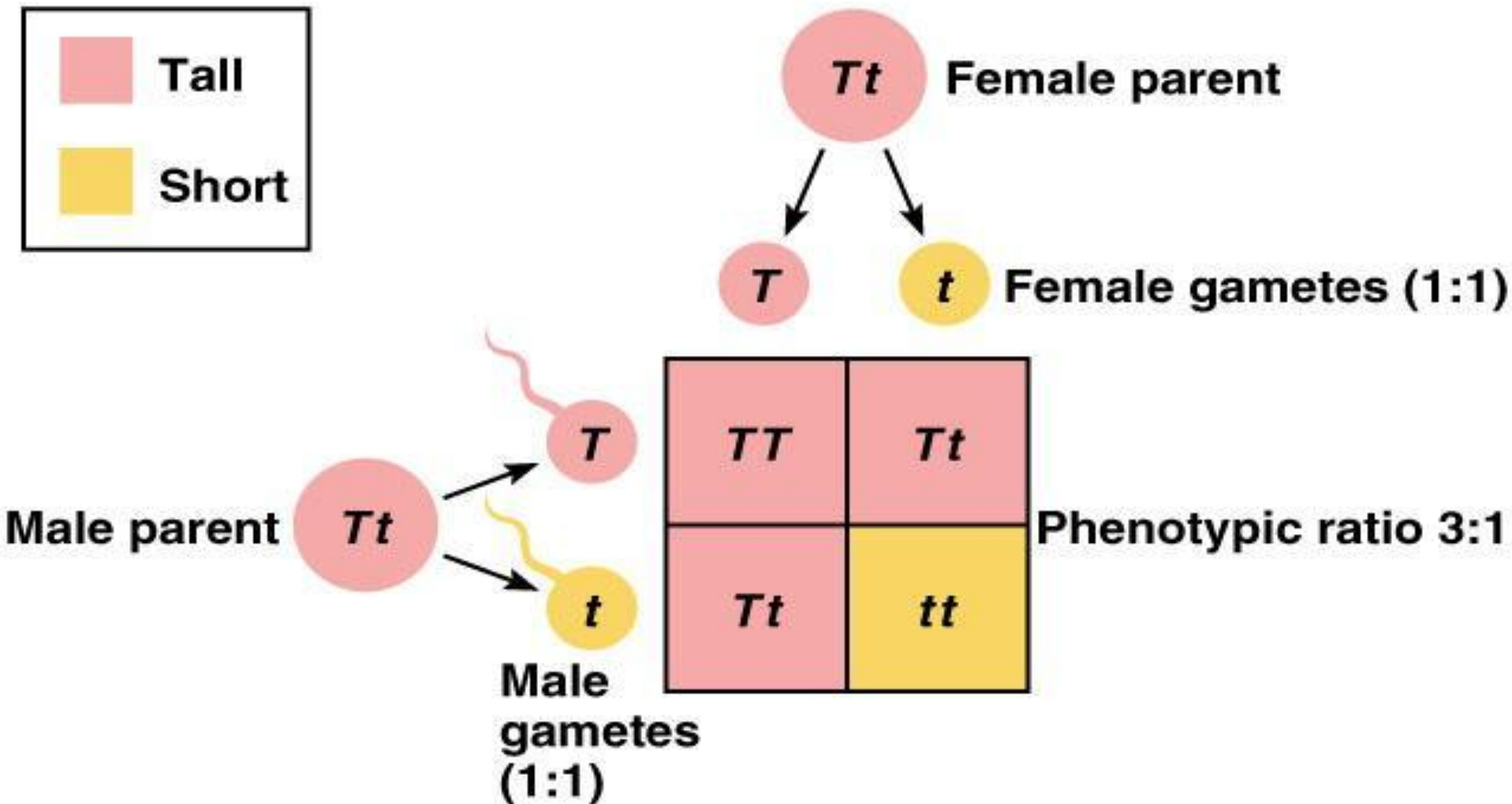
- Responsible for the Laws Governing Inheritance of Traits
- Called the “Father of Genetics”



# Law of Segregation

- During the **formation** of gametes (eggs or sperm), the **two alleles** responsible for a trait **separate** from each other.
- Alleles for a trait are then **"recombined"** at fertilization, producing the genotype for the traits of the offspring.

# Applying the Law of Segregation



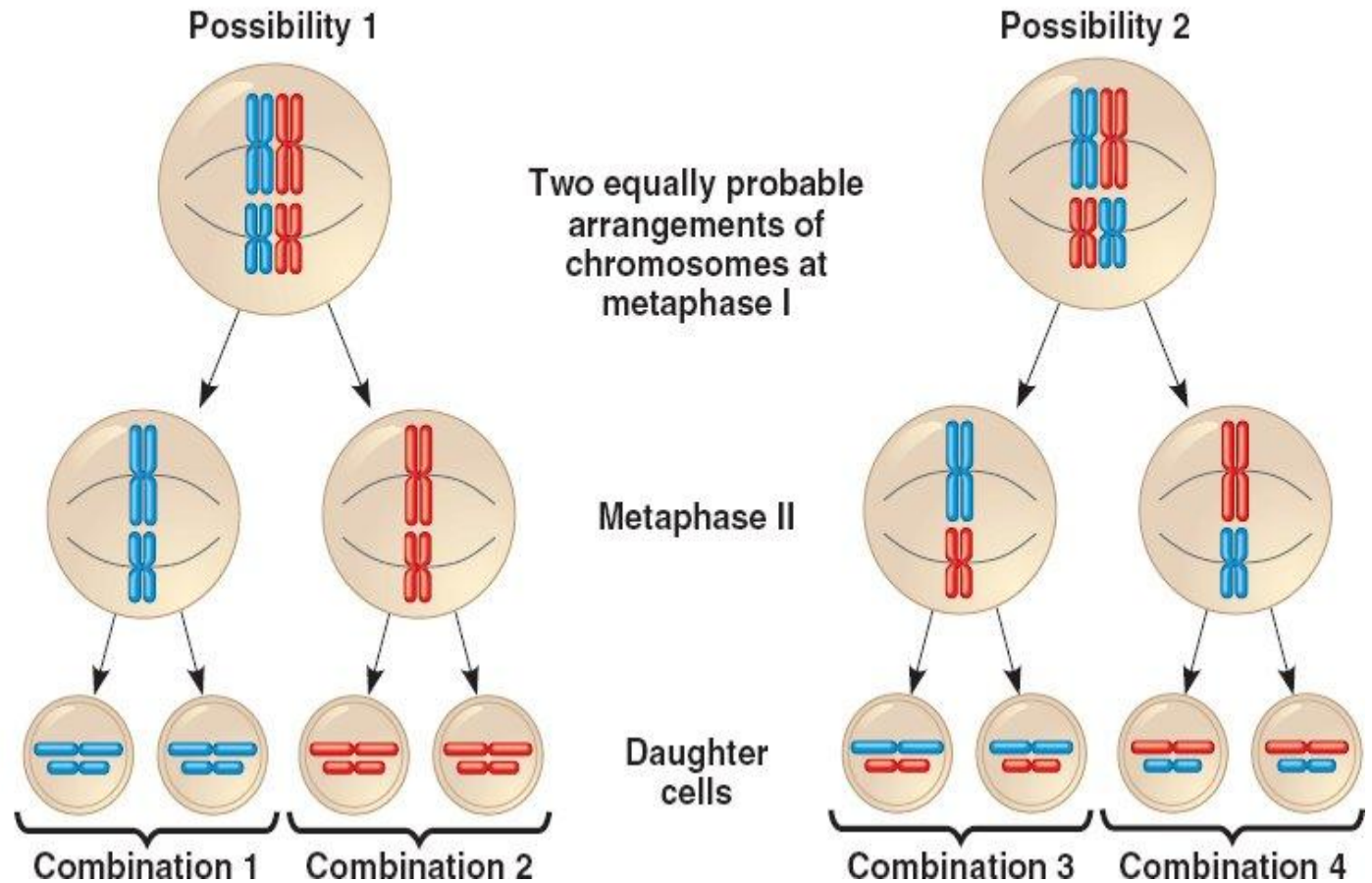
# Law of Independent Assortment

- Alleles for *different* traits are distributed to sex cells (& offspring) independently of one another.
- Homologous chromosomes line up randomly during Meiosis

# Law of Independent Assortment

## Key

- Maternal set of chromosomes
- Paternal set of chromosomes



# Punnett Squares

- Used to predict the traits of offspring
- P = parent generation
- $F_1$  = first generation
- $F_2$  = second generation

Mom's genotype

Dad's genotype

|  |  |  |
|--|--|--|
|  |  |  |
|  |  |  |
|  |  |  |

Possible Offspring  
genotypes

# Mendel's Experiment

$T$  = tall pea plant  
 $t$  = short pea plant

- Parent Generation:  $TT$  x  $tt$   
(tall) (short)

|  |  |
|--|--|
|  |  |
|  |  |

# Mendel's Experiment

- First Generation:  $Tt \times Tt$

(tall)

(tall)

$T$  = tall pea plant  
 $t$  = short pea plant

|  |  |
|--|--|
|  |  |
|  |  |

Red eyes are dominant to sepia eyes in fruit flies. Cross a homozygous red eye fly with a heterozygous fly. Designate alleles. What are the resulting genotypes and phenotypes for the offspring?

|  |  |
|--|--|
|  |  |
|  |  |

**Brown eyes** are dominant to **blue eyes**. What are the resulting genotypes and phenotypes for the offspring of two **blue eyed** people?

|  |  |
|--|--|
|  |  |
|  |  |

Long ears (e) are recessive to short ears (E) in bunnies. What are the resulting genotypes and phenotypes for the offspring of a homozygous short eared bunny and a homozygous long eared bunny?

|  |  |
|--|--|
|  |  |
|  |  |