

Heredity & Genetics















- **heredity** = the passing on of traits from parents to offspring
- **trait** = any characteristic that can be passed from parent to offspring
- **genetics** = the study of heredity



Gregor Johann Mendel (1822-1884)

- "Father of Genetics"
- Austrian monk
- studied inheritance of traits in pea plants



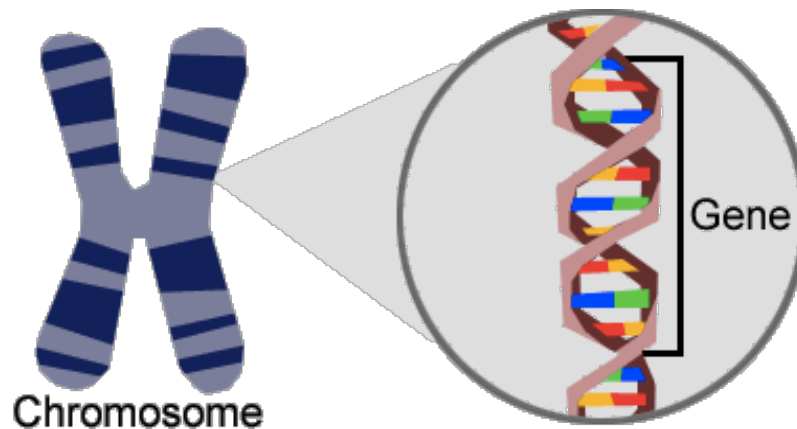
Seed		Flower	Pod		Stem	
Form	Cotyledon	Color	Form	Color	Place	Size
						
Round	Yellow	White	Full	Green	Axial pods	Tall
						
Wrinkled	Green	Violet	Constricted	Yellow	Terminal pods	Short
1	2	3	4	5	6	7

> found plants' offspring retained traits of parents

- work not recognized until turn of 20th century

Remember . . .

- > individuals have 2 of each **chromosome** - one from each parent
- > chromosomes carry **genes** which are instructions that determine **traits**



Genetic terminology

Let's use the example of yellow & green peas . . .

- **dominant** gene = always expressed regardless of other gene present; represented by capital letter (Y)
- **recessive** gene = only shows if other gene is also recessive; represented by lower case letter (y)
- **allele** = different forms of a gene; yellow (Y) and green (y)
- **genotype** = the gene combination for a trait; YY, Yy, yy
- **phenotype** = the physical feature resulting from a genotype; yellow or green
- **homozygous** genotype = gene combination with two of the same alleles; YY or yy
- **heterozygous** genotype = gene combination of one dominant and one recessive allele; Yy

Some human traits:

*NOTE: most of these traits are controlled by a more complex system of inheritance (multiple genes interacting or multiple alleles), but we will simplify it for our purposes



curly/wavy hair



dimples



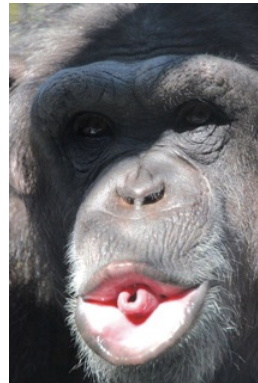
freckles



widow's peak



straight hairline



tongue roller



"Free" earlobes "Attached"



hitchhiker's thumb



hand clasp

left thumb on top right thumb on top



straight thumb

Dominant Trait	Recessive Trait	Phenotype	Genotype	# in class dominant	% dominant	# in class recessive	% recessive
Brown eyes (B)	Non-brown eyes (b)						
Curly/wavy hair (C)	Straight hair (c)						
Freckles (F)	No freckles (f)						
Dimples (D)	No dimples (d)						
Widow's peak (W)	Straight hairline (w)						
Tongue roller (R)	Non-roller (r)						
Mid-digit finger hair (H)	No hair on mid-digits (h)						
Free earlobes (E)	Attached earlobes (e)						
Straight thumb (T)	Hitch-hiker's thumb (t)						
Hand clasp, left thumb on top (L)	Hand clasp, right hand on top (l)						
PTC taster (P)	PTC non-taster (p)						