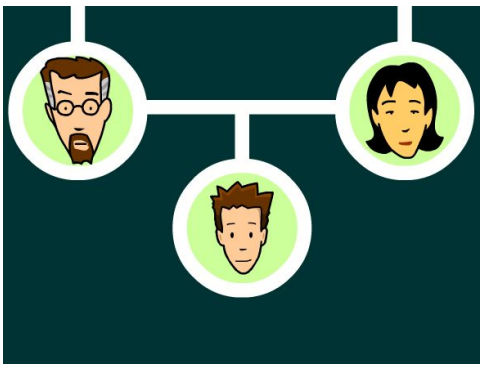
Basic Genetics

The study of Heredity



Gregor Mendel - Father of Genetics

Studied the garden pea to learn more about inherited characteristics. Why a pea plant?

The garden pea has many traits that show only 2 forms

Ex. Height - tall and short

Pea colour - green and yellow

Seed shape - round and wrinkled

Mendel's Experiments

Developed purebred plants for the two forms.

Purebred short and purebred tall = P1 generation (1st parental)

1st Experiment - mated the P1 plants - tall x short

Possible Results:

All Tall; all short; all medium; some tall and some short

Actual Results: 100% tall

Traits that Mendel observed:

Mendel's Experiments

Experiment 2: Mated the offspring plants - F1 generation

Results: 75% tall; 25% short

What happened?

Experiment 1:

Phenotype
P1 Tall = TT

Genotype
Short = tt

	T	T
t	Tt	Tt
t	Tt	Tt

Phenotypic Ratio:
100% tall

Genotypic Ratio:
100% Tt

Tall allele is dominant over short allele

Mendel's Experiments

Experiment 2:

F1 Mating: Tall (Tt) x Tall (Tt)

	T	t
T	TT Tall	Tt Tall
t	Tt Tall	tt Short

Phenotypic Ratio
75% Tall
25 % Short

Genotypic Ratio:
25% TT
50% Tt
25% tt

Try This Experiment

What would happen if you crossed a homozygous tall plant with a heterozygous tall plant?

TT x Tt

	T	T
T	TT Tall	TT Tall
t	Tt Tall	Tt Tall

Phenotypic Ratio

100 % Tall

Genotypic Ratio:

50 % TT
50% Tt

Sex Determination

Punnett squares can also be used to show how gender is selected in humans.

The 23rd set of chromosomes are the sex chromosomes.

If you have 2 X chromosomes you are female.

If you have 1 X and 1 Y chromosome you are male.

What is the probability of having a boy or a girl?

Sex Determination

XX (female) mates with XY (male)

Families have a 50:50 chance of having a boy or girl with each pregnancy

	X	X
X	XX	XX
Y	XY	XY