

Chapter 11 & 14: Introduction to Genetics & The Human Genome

History

- _____: passing of traits from parent to offspring
- _____: The scientific study of heredity
- Trait: A characteristic that can be passed from parent to offspring
- _____ carry the traits and _____ determines which traits will be carried by the gametes (sex cells)!
- Gregor Mendel: Austrian Monk who, in the 1860's, used _____ and statistics to study _____

Why Peas?

1. Ideal Flower Structure
2. Presence of _____ traits
3. _____ Reproduction Cycle (_____ days)

How?

1. 1st grew 7 traits " _____ " thru self-pollination
Example: plant height, seed color, seed shape, pod shape, pod color, flower type...etc
2. He _____ (hybridized) different plants to see what the offspring would look like...
 - tall x short
 - yellow x green seeds
 - wrinkled seeds x smooth seeds...and found he got _____ outcomes

Denoting Generations

P = _____
F1 = First generation of offspring (From crossing parents)
F2 = _____ generation of offspring
F3 = Third generation of offspring

- Gene: _____ of a chromosome that _____ for a trait
- For every trait, a plant must carry a _____ of genes
- Offspring receive _____ gene from each parent

- _____: Different and distinct forms of genes
- _____: A form of gene that is seen when two _____ alleles are present
- _____: A form of gene that is _____ seen (masked) when paired with a dominant allele. Two recessives must be present for the recessive gene to be seen.

Principles of Inheritance

Representing Alleles

-Pea color is controlled by a _____ gene with 2 alleles

- Dominant = Y = yellow (note: _____ = Dominant)
- Recessive = y = green (note: _____ = recessive)
- _____: The _____ make-up of an organism (both genes in a homologous pair of chromosomes) (ex: YY or Yy or yy)
- _____: The outward _____ of the trait (ex: yellow or green)
- Homozygous: When two alleles in a gene pair are _____ (Purebred) (ex: YY or yy)
- Heterozygous: When two alleles in a gene pair are _____ (Hybrid) (ex: Yy)

Mendel's Laws

Basic Rules of Inheritance

1. Law of _____: Alleles are _____ during meiosis (each reproductive cell receives only one of a pair of alleles)
2. Law of _____ Assortment: Genes for one trait are inherited _____ from other genes
-example: tall allele (plant height) is not linked to green allele (pea color)
3. Law of _____: One allele in a pair will _____ the other, preventing it from being seen
 - Dominant allele is _____
 - Recessive allele is _____

Genetics and Predictions

- _____: The _____ of an occurrence or event
(ex: coin flip, weather)
Represented using:
 1. Fractions (1/2)
 2. Percentages (50%)
 3. _____ (1:1)
- _____ Squares: Used for predicting the crossing of two organisms, showing the _____ of certain phenotypes/genotypes (not actual results!)
 - _____ hybrid: Looks at _____ trait at a time
 - _____ hybrid: Looks at _____ traits at a time
 - Trihybrid: Looks at 3 traits at a time
 - Tetrahybrid: Looks at 4 traits at a time

How to make a Punnett Square

1. Make a grid
2. Place alleles of 1 parent on the top of grid, alleles of other parent along left side
3. Fill in the grid
 - a. combine parent alleles inside the boxes (letters show genotypes)
 - b. determine the genotypic ratios
 - c. determine the phenotypic ratios

Dihybrid & Trihybrid crosses use the same method as monohybrids, but use a larger grid to accommodate ALL of the possible parental genotype combinations

Ch 14: Predictions and People

- Humans & higher organism traits are more complex
 - Longer time between generations
 - _____ offspring
 - _____
- _____: _____ that shows how a trait and the genes that control it are inherited within a family
 - Information is key!
 - Often blood (DNA) collected (if possible)

Another example:

- Hypercholesterolemia (humans)
 - HH = Normal
 - Hh = _____ higher cholesterol levels (1 in 500)
 - hh = 5X higher cholesterol levels (1 in 1,000,000)

2. Codominance: _____ alleles in a heterozygote express themselves

– Ex: Human Blood Type

Antigen on RCB	Genotype	Serum Agglutinin
A = A type	I ^A I ^A or I ^A i	Anti-B
B = B type	I ^B I ^B or I ^B i	Anti-A
AB = Both types	I ^A I ^B	None (Universal _____)
O = None	ii	Both Anti-A & Anti-B (Universal _____)

- Another example: Roan Cow

3. _____ Traits: A trait controlled by 2 or more genes

– Ex: Eye color, Skin color, many others

- Multiple Alleles: ____ or _____ alleles in a population Ex: Blood typing

Linked Genes

- Linkage

– A _____ chromosome contains many different
_____ that control many different _____

DNA	City
_____	people
section of DNA (gene)	one _____
chromosome	many buildings (1 street)

- _____ of Heredity: specific genes controlling
_____ traits are located on _____ Chromosomes

Punnett's Experiment

P PPLL x ppll
F1 PpLl

- F2 not 9:3:3:1...greater than expected number has phenotype of P Generation
- **Determined that traits were some how linked and did _____ sort independently
- _____ genes: those that are located on the same gene
 - do not sort independently

Sex Linkage

- Chromosomes

- _____ Chromosome: determine whether the _____ are male or female

- _____: _____-sex chromosomes

- Females: X _____ - _____ eggs have a single X chromosome

- Males: X _____ - 1/2 of all sperm have an _____ and 1/2 have a _____ chromosome

Sex Linked

- Sex-linked genes: genes found _____ in the X chromosome are _____...genes found only in the _____ chromosome are Y-linked

- P Red-eyed female x White-eyed male

- F1 Males and females _____ red-eyed

- F2 1/2 red-eyed females
1/4 red-eyed males
1/4 white-eyed males

Sex Linked Traits in Humans

- Red-green color _____ caused by _____-linked recessive allele (Xc) (allele for normal color vision XC)

- color blind male XcY

- color blind female XcXc

- _____ caused by X-linked allele

- Males get X-linked traits from their _____

- _____ get X-linked traits from _____ parents