TOPIC 1: Introduction to the Cell & Cell Theory

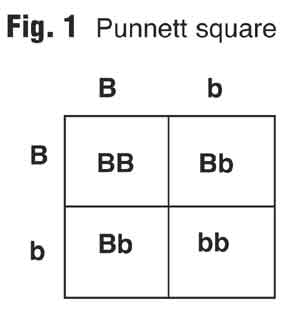
* The Cell Theory
  + All things are of one or more .
  + Cells are the of and in an organism.
  + Cells come only cells.
* Cells are Diverse
  + in , , and organization.
* Why Are Cells So Small?
  + Transport
    - Cell to surface ratios favor size.
  + Control
    - Nucleus to consideration.
* How small can a cell be?
  + Mycoplasmas
    - bacteria that are to mm (1/10 the size of bacteria).
    - Note: 1.0 mm = one of a meter
* All cells have
  + (cell) Membrane
  + (eukaryotes only)
  + (an area)
  + (structures with specialized functions)
* Cell Types
  + Prokaryotes- cells that have membranes
    - example =
  + Eukaryotes- cells that do have , -bound structures
    - examples = and
* Timeline
  + Prokaryotic Organisms:
    - First appeared OF YEARS AGO
    - include and
  + Eukaryotic Organisms:
    - First appeared of years ago
    - include , , and
* Key Differences:
  + Prokaryotes
    - Lack a and other bounded structures.
    - Have small
    - DNA is not organized into
    - are not made of and does not have a 9+2 structure
    - Cell walls are made of , not
  + Eukaryotes
    - Have a and other bounded structures.
    - Have large
    - DNA is organized into
    - Flagella are made of and have a 9+2 structure
    - Cell are made of

TOPIC 2: The Organization of Living Things

* As organisms develop, their cells (change & separate) and form of organization
* Why it Matters
  + Humans (we are ) can have kinds of , , , and
* Unicellular Organisms
  + “uni-” =
  + are unicellular organisms
    - Some , some , and some , are unicellular
  + Can still do they need to stay alive
  + Benefits over multicellular organisms:
    - Need resources
    - Can live in conditions
* Multicellular Organisms
  + multi-” =
  + , , some , and fungi are multicellular
    - Start as a cell 🡪 cells 🡪 cells differentiate (change) into of cells 🡪 cells together
  + Characteristics
    - Larger size
      * have predators and have more options of
    - Longer life
      * organism will to live even if cell dies
    - Specialization
      * each type of cell has a job, making the organism more
* Levels of Organization
  + 1st Level:
  + 2nd Level:
  + 3rd Level:
  + 4th Level:
  + 🡪 🡪 🡪
* Level 1 : Cells
  + Cells can be (have a certain function)
    - Function =
  + Function is related to the
    - Structure = how are put

      * it’s made from
    - Structure of a cell is different from cell
* Level 2: Tissues
  + Tissue = of cells that work together to do a job
    - Ex: Heart muscle is made of heart muscle
  + Animals have 4 types of tissue
  + Plants have 3 types of tissue
* Level 3: Organs
  + Organ = structure that is made up tissues working together to get a job done
    - Ex: Stomach – tissue moves food, tissues make to digest food, tissue holds stomach together, tissue sends messages back and forth between the stomach and brain
* Level 4: Organ Systems
  + Organ system = group of organs working to perform a specific
  + Each organ system has a
    - Ex: Digestive system is made of including the stomach and intestines
* Structure of Animals
  + Cells
    - of an animal’s structure
    - become
  + Tissues
    - made of cells that to perform a function
  + Organs
    - made of different of tissues that work to perform a function
  + Organ Systems
    - made of that work to perform a function
  + Organisms

TOPIC 3: Genetics Using Punnett Squares

* Early Genetics
  + The study of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ began with observations made by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Mendel.
  + After noticing that the flowers his pea plants were either violet or white, Mendel began to study the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ traits.
    - Between 1856 and 1863 he \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and tested at least 28,000 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Remember that Mendel worked \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_years ago when nobody knew about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or even the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that carry genes.
  + Let’s consider a single gene…
    - A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carries information that determines your \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Traits are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from your \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Genes are located in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Chromosomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and there are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of genes in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - In humans, a cell’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ individual chromosomes or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pairs of chromosomes.
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the chromosomes come from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and half come from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - This is a human \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ representing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of chromosomes in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Definitions
  + Allele- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Genotype- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Phenotype- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Dominant trait refers to a
  + The term "recessive” describes
  + Homozygous= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Heterozygous= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Genetics
  + study of are passed from to
* Traits
  + are by the on the .
* A gene
  + a segment of that determines a .
* Chromosomes
  + come in pairs, thus come in pairs.
* Homologous pairs –
  + matching genes – one from parent and one from parent
    - Example:
      * Humans have chromosomes or pairs.
        + One set from dad – 23 in
        + One set from mom – 23 in
* Alleles
  + different (possibilities) for the same –
    - ex: blue eyes or brown eyes
* Dominant and Recessive Genes
  + dominant
    - Gene that the other gene from
  + recessive
    - Gene that does “show” even though it is
  + Symbol –
    - Dominant gene – case letter – T
    - Recessive gene – case letter – t
    - Both genes of a pair are the –
      * homozygous or purebred
        + TT – dominant
        + tt – recessive
      * One and one gene – or hybrid
        + Tt – heterozygous
* Genotype and Phenotype
  + of genes an organism has ( ) – genotype
    - Ex: TT, Tt, tt
  + Physical resulting from gene make-up –
    - Ex: hitchhiker’s thumb or straight thumb
* Punnett Square and Probability
  + Used to the possible gene of offspring
  + Punnett Square
    - Example: Black fur (B) is dominant to white fur (b) in mice
* Practice
  + We use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to represent the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ letter represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_form of a gene (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_letter is the abbreviation for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_form of the gene (allele).
  + Example below: P=dominant purple and p= recessive white
  + The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for this flower is violet/shaded while its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (if homozygous) is PP.
  + The phenotype for this flower is white while its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is pp (to be white the flower \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the recessive copies of the allele).
* Punnett Squares
  + The Punnett square is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_way of working out what the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of two parents will be.
    - It is a helpful tool to show allelic combinations and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ offspring ratios.
  + 
  + How to set up a Punnett Square
    - We begin by constructing a grid of two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lines.

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

* + - Next, put the genotype of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_across the top and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ along the left side.
      * For this example lets consider a genotype of BB crossed with bb.

|  |  |  |
| --- | --- | --- |
|  | B | B |
| b |  |  |
| b |  |  |

* + - * Notice \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_letter goes above each box
        + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_matter which parent’s genotype goes on either side.
    - Next, fill in the boxes by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and row head-letters down and across into the empty spaces.

|  |  |  |
| --- | --- | --- |
|  | B | B |
| b | Bb | Bb |
| b | Bb | Bb |



* Now that we have learned the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of genetics lets walk through some examples using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Squares.

|  |  |  |
| --- | --- | --- |
|  | W | w |
| W | WW | Ww |
| w | Ww | ww |

* + Usually \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the capital letter first
    - Lets say:
      * W- dominant white
      * w- recessive violet
  + Parents in this cross are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Ww).
    - Note: Make sure I can tell your capital letters from lowercase letters.
  + What percentage of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will have violet flowers?
    - ANSWER: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ recessive)
* Red hair (R) is dominant over blond hair (r). Make a cross between a heterozygous red head and a blond.

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| --- | --- | --- | --- |
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* + What percentage of the offspring will have red hair?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Let’s try some more…
  + In pea plants, tall pea plants (T) are dominant over short pea plants (t). Construct a Punnett

Square for a heterozygous tall pea plant and a short pea plant.

|  |  |  |
| --- | --- | --- |
|  |  |  |
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* + What are the percentage of phenotypes?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tall
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ short
* Black eyes (R) is dominant over red eyes (r) in rats. Make a cross between a homozygous rat with black eyes and a rat with red eyes.

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

* + What is the possibility of a red eye off springs?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_