PEER Life Science Cells Are Us Gateway to the Cell Notes Outline

**Why It Matters**

* Gregor \_\_\_\_\_\_\_\_\_ is considered the father of \_\_\_\_\_\_\_\_\_\_\_\_.
* The physical origin of traits is \_\_\_\_\_\_\_\_ made up of DNA found on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the nucleus.
* Name three fields use DNA in important ways
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**How We Know**

* Mendel used pea plants to discover the process of \_\_\_\_\_\_\_\_\_\_\_ or the passing of traits from parents to offspring.
* When Mendel bred a true breeding green pea plant and a true breeding yellow pea plant, all of the offspring were green/yellow. This color covered the other, making it dominant. The yellow is therefore \_\_\_\_\_\_\_\_\_\_\_\_, meaning that it does not show up unless it is the only trait present.
* Fill in a Punnett square for a cross between two Gg pea plants.

|  |  |  |
| --- | --- | --- |
|  | G | g |
| G |  |  |
| g |  |  |

* + What fraction of the offspring would have green pods?
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The two alternative forms of the pea pod color gene are found at the same place on a chromosome and are called \_\_\_\_\_\_\_\_\_\_.
* Mendel came up with three laws of heredity. They are:
  + 1. The Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: While each trait is defined by a pair of alleles for the same gene, parental alleles are randomly separated to sex cells so these cells only contain one version of the gene. Consequently, offspring only receive one allele from each parent.
  + 2. The Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Assortment: Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.
  + 3. The Law of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: An organism with alternate forms of a gene will express the form that is dominant.
* Genes are generally defined as a piece of \_\_\_\_\_\_ in chromosomes that control a bodily trait.
* There are four DNA bases that pair together to create a DNA sequence: \_\_\_\_\_\_\_\_\_\_ (A), \_\_\_\_\_\_\_\_\_\_\_ (T), \_\_\_\_\_\_\_\_\_\_\_ (C), and \_\_\_\_\_\_\_\_\_\_\_ (G). Each base only pairs with one other base in DNA. Adenine only pairs with \_\_\_\_\_\_\_\_\_\_\_\_\_ and cytosine only pairs with \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Fill in the blanks with the appropriate base pair.
    - A - \_\_
    - G - \_\_
    - C - \_\_
    - T - \_\_
* \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_ are credited with discovering the structure of DNA. The most useful x-ray crystallography was taken by Rosalind \_\_\_\_\_\_\_\_\_\_\_\_ and Raymond Gosling. Through their research, they found that DNA has a double \_\_\_\_\_\_\_\_\_ structure. This structure looks kind of like a spiral staircase where each step is a base pair (A, T, C, G) and the edges/railings are the sugar phosphate backbone.
* The first gene maps were done in \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ because they have a small \_\_\_\_\_\_\_\_ (complete set of genes in an organism)
* DNA sequencing has shown that humans have only about \_\_\_\_\_\_\_\_ genes which is only about 1% of the total genome (the rest are involved in regulating protein production). This is only about twice as many genes as fruit flies have, and some mice and rice have more/fewer genes than humans. This could be due to:
  + Humans making more \_\_\_\_\_\_\_\_\_\_\_ proteins
  + Humans having more \_\_\_\_\_\_\_\_\_\_\_\_ genes that turn other genes on or off
  + Humans might use many \_\_\_\_\_\_\_ to make one protein and therefore different combinations can make different proteins
* The main difference between us and other primates is less so what genes we do or don’t share as much as what genes are \_\_\_\_\_\_\_\_\_\_\_.

**What We Know**

* Genes are found in chromosomes inside of the cell nucleus which is considered the “\_\_\_\_\_\_\_” of the cell.
* Humans have \_\_\_\_ pairs of chromosomes or \_\_\_\_ in total. Our reproductive cells only have 23 because they combine together at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to make 46. As a result, half of your chromosomes come from your father through the \_\_\_\_\_\_\_ and half come from your mother through the \_\_\_\_\_.
* In humans, the last pair of chromosomes is different/the same in males and females. If the individual has \_\_ and \_\_ chromosomes, they are genetically female; while if they have an \_\_ and \_\_ chromosome, they are genetically male.
* Different species have different numbers of \_\_\_\_\_\_\_\_\_\_\_\_\_, and this number does not correlate with the complexity of the species.
* DNA stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_.
* When a cell divides and DNA \_\_\_\_\_\_\_\_\_\_\_\_\_, the base pairs pull \_\_\_\_\_\_\_ like a zipper unzipping. Each half of the unzipped chain is used as a template to form two new copies for the two new daughter cells.
* In order for DNA to make proteins, it must first be \_\_\_\_\_\_\_\_\_\_\_\_\_ into \_\_\_\_\_\_\_\_\_\_\_ RNA (mRNA). During this process, DNA partially unzips like it did during replication, and RNA base pairs form a complement to the DNA gene. mRNA is similar to DNA except a base called \_\_\_\_\_\_\_\_ is substituted for thymine and pairs with adenine.
* After DNA is transcribed, the mRNA must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to code for amino acids.
  + There are \_\_\_\_ known amino acids used in the body. In order for the four nucleotide bases to code for all of these amino acids, it takes \_\_\_\_\_\_ bases to code for a single amino acid.
  + The string of mRNA that was formed by complementing the DNA segment, is then paired with a complementary \_\_\_\_\_\_\_\_\_\_ RNA or tRNA. The tRNA has \_\_\_\_\_\_\_ RNA bases and an amino acid. The tRNA matches with the mRNA three bases at a time and creates a string of amino acids in the order determined by the \_\_\_\_\_\_.
  + Translation occurs in an organelle called the \_\_\_\_\_\_\_\_\_\_\_. Sometimes ribosomes are found on the membranes of an organelle called the \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ or RER.
  + After a protein has been made in the RER, it is usually moved into another membranous organelle called the \_\_\_\_\_ \_\_\_\_\_\_ which modifies proteins by adding sugar residues. This helps to give proteins their unique functions.

**Common Hazards**

* \_\_\_\_\_\_\_\_\_\_\_\_ are a family of toxins produced by certain types of \_\_\_\_\_\_\_ that are found in crops like corn, peanuts, cottonseed, and nuts.
* Aflatoxin can contaminate crops in the \_\_\_\_\_\_\_, at \_\_\_\_\_\_\_\_\_, and during \_\_\_\_\_\_\_\_\_.
* Exposure to aflatoxin can cause \_\_\_\_\_\_\_ cancer because it causes chemical bonds to form on pieces of \_\_\_\_\_ that can trigger cancerous DNA replication and cell division.
* People are exposed to aflatoxins from the \_\_\_\_\_\_\_ they eat. They are difficult/easy to detect because we cannot \_\_\_\_\_\_\_ them or sometimes even \_\_\_\_\_ them.
* The \_\_\_\_\_\_\_ of all species of animals are most affected by aflatoxins and can experience \_\_\_\_\_\_\_\_\_\_\_ distress, \_\_\_\_\_\_\_\_, jaundice, reduced \_\_\_\_\_\_\_\_\_\_, and decreased \_\_\_\_\_\_\_.
* Exposure to aflatoxins can be avoided by:
  + Throwing away all food contaminated with mold
  + Storing food in a cool, dry place.
  + Buying only major brands of nuts and peanut butters
  + Discarding any nuts that look moldy, discolored, or shriveled.