| **Class Notes**<br>*Principles of Genetics, part 1*<br>**Questions/Main Idea:** | Name: _____<br>Period:_____<br>Date: _____<br>**Notes:** |
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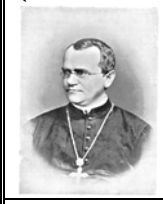
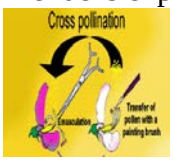
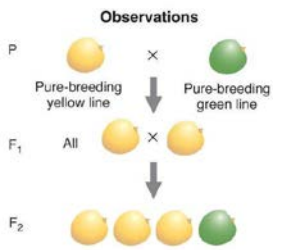
| Gregor Mendel (1822-1884)<br>  | • German monk born in 1822<br>• Lived in what is now the Czech Republic<br>• Tended the garden at his monastery, conducted experiments with pea plants<br>• Studied peas for 7 years, published results 1866; ignored until 1900<br>• Now considered the "Father of Genetics" |
| What is a **trait**? | • A trait is a characteristic that can vary from one individual to the next (e.g., eye color)<br>• Mendel chose 7 pea plant traits to study:<br>o seed shape, seed color, flower color, pod shape, pod color, flower position, plant height<br>• He was lucky that each trait happened to be located on different chromosomes (people didn't know about chromosomes back then) |
| Mendel's experiments<br>  | • First, he created **true (pure) breeding** pea plants<br>• Then he experimented with different traits (one at a time)<br>• He **cross-pollinated** plants with different traits, and observed the offspring |
| What is **true (pure) breeding**? | • **True (pure) breeding** = offspring always have same trait as parent (every time, no matter what!) |
| What is **self-pollination**? | • **Self-pollination** = plant fertilizes itself |
| What is **cross-pollination**? | • **Cross-pollination** = one plant fertilizes another |
| What is the **P generation?** | • **P generation** = Parent generation |
| What is the **$F_1$ generation**? | • **$F_1$ generation** = 1st generation offspring ("filius" is Latin for "son"; offspring of P generation |
| What is the **$F_2$ generation**? | • **$F_2$ generation** = 2nd generation offspring (offspring of $F_1$ generation) |
| What were the results of Mendel's P generation crosses? | • The $F_1$ generation were **all tall** |
| What were the results of Mendel's $F_1$ generation crosses? | • Some of the $F_2$ offspring were tall, and some were dwarf<br>• The ratio was always 3 tall to 1 dwarf (3:1) |
| Mendel's findings<br>  | • When Mendel crossed true-breeding plants with different traits, all of the $F_1$ plants showed only one trait (e.g., all tall); the $F_2$ plants showed a 3:1 ratio<br>• He did not get "medium" plants!<br>• He called the traits **dominant** (showed in $F_1$ generation) or **recessive** (didn't show up in the $F_1$ generation) |

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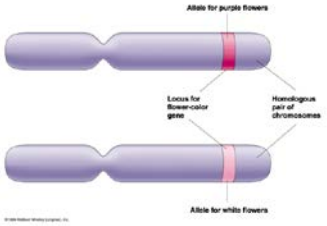
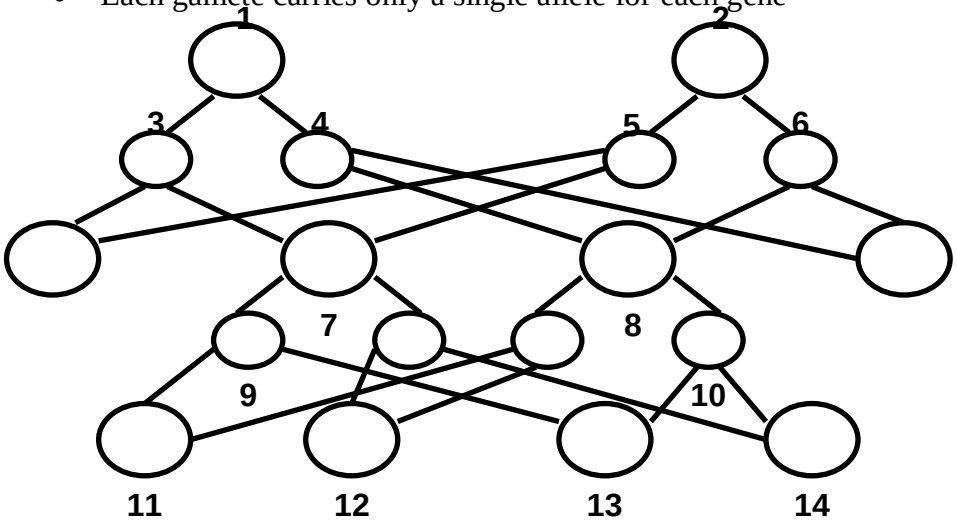
| Mendel's conclusions<br>  <br> | Mendel realized that:<br>1. Inheritance of traits is controlled by genes contributed by each parent (e.g., flower color)<br>2. These genes come in different forms, called alleles (e.g., purple or white flowers)<br>3. Some alleles are dominant while others are recessive.<br>• When both types of alleles are present, dominant alleles mask (cover up) recessive alleles. |
| What is Mendel's Law of Dominance? | • Generally, one allele is dominant to another<br>• <u>Dominant</u> allele always expressed, even if combined with recessive allele<br>o written as ***uppercase*** letter of the trait<br>o e.g., tall = dominant: TT, tT, or Tt<br>• <u>Recessive</u> allele expressed **only** if dominant allele is not present.<br>o written as a ***lowercase*** letter of the dominant trait<br>o e.g., dwarf = recessive: tt |
| What is **genotype**? | • **Genotype** = genetic combination of alleles (e.g., TT, Tt, tt) |
| What is **phenotype**? | • **Phenotype** = physical characteristic or trait (e.g., tall, short)<br>• |
| What is **homozygous**? | • **Homozygous** = both alleles are same (e.g., TT) -- "true breeding"<br>• |
| What is **heterozygous**? | • **Heterozygous** = alleles are different (e.g., Tt)<br>• |
| What is **hybrid**? | • **Hybrid** = offspring of crosses of parents with different traits (e.g., offspring of TT and tt) |
| What is Mendel's Law of Segregation?<br><br>Circle # \| 1 \| 3 \| 7 \| 14<br>Genotype:<br>Homozyg?<br>Phenotype:<br>Generat'n:<br>Gamete? | • When gametes form, the alleles from each parent are <u>segregated</u> (separated) from each other<br>• Each gamete carries only a single allele for each gene<br>  <br> |
| What is Mendel's Law of Independent Assortment? | • Genes for two different traits are inherited independently<br>• There is no connection between them (e.g., plant height and seed color) |
| **Summary:** | |
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