

Chapter 11: Observing Patterns in Inherited Traits

Mendel's Insights: An Introduction

- 150 years ago, natural selection explained that _____ was necessary for _____ change
- At that time, the accepted view of inheritance was _____ of traits
- Blending, however, does not allow for an increase in _____
- Blending (if it happened) would produce _____ populations (all _____)
 - _____ do not fit blending
 - Offspring of a black horse and a white horse are not always _____
- Gregor Mendel used his _____ of garden plants and a knowledge of _____ to create a new hypothesis

Mendel's Insights: Experimental Approach

- Mendel experimented on _____ plants
 - In nature, pea plants always _____
 - This means that Mendel had _____ varieties in his garden
 - Pea plants have _____ traits that come in _____ different forms each
 - Example: Plant height is _____ or _____
- Mendel could force the plants to _____
 - He could choose to cross a purebred _____ plant with a purebred _____ plant
 - In doing this, he could easily _____ the concept of blending
 - With further _____ and lots of _____, he discovered the truth

Mendel's Insights: Vocabulary (Modern)

- Gene – instructions for producing a _____
- Locus – the _____ of a gene on a _____
- _____ cells have two genes (a gene _____) for each trait – each on a _____ chromosome
- _____ are various forms of a gene for the same _____
- _____ – an individual that contains two identical alleles for a trait
- _____ – an individual that contains non-identical alleles for a trait
- In a heterozygous individual, one allele is _____ and hides effect of the other _____ allele
- _____ – a listing of alleles for an individual's trait
- _____ – an individual's observable traits

Mendel's Insights: Segregation

- Mendel's first major principle is _____: during meiosis only _____ gene per trait is placed into each _____
- He discovered this concept (along with _____) by performing _____ crosses
- A monohybrid cross is a breeding of _____ parents (the "____" generation) with _____ forms of a trait
- In a monohybrid cross, one form of the trait _____ in the first generation of offspring (the ____ generation)
- All members of F₁ are _____ (____)
 - One parent was _____ and the other was _____
- The ____ generation required a _____ analysis
 - There is a _____ ratio of phenotypes
 - This proves a lack of _____
- The _____ allele must still be present in the ____ plants in order to be given to the _____ plants
- The reason for the _____ ratio is fact that each _____ has an equal chance of _____ an egg
- Each sperm and egg from the F₁ plants has an equal chance of "____" or "____"
- A _____ square can make predictions

Mendel's Insights: Test Crosses

- Another major breakthrough from Mendel was the idea of _____ crosses
- An individual with a _____ phenotype has a known genotype (____)
- An individual with a _____ phenotype has an unknown genotype (____ or ____)
- Crossing an unknown with a _____ individual will let you determine the unknown (use a _____ square)

Mendel's Insights: Independent Assortment

- Mendel also performed _____ crosses (____ traits studied at the same time)
- Mendel correctly predicted that all F₁ plants would show _____ for both traits, regardless of the combination in the _____
- The ____ offspring will show a phenotype ratio of _____
- This shows that each trait's _____ travels and is sorted _____ of other genes

- We now know today that this is only true if the _____ for the two traits are on _____ chromosomes
- If the genes for the two traits are on the _____ chromosome, then they usually are sorted _____

Beyond Mendel: Dominance Relations

- Sometimes, a heterozygote will show _____ of the two alleles – this is now called _____ dominance
- Sometimes, a heterozygote shows _____ alleles at the same time (_____)
- Some traits have _____ than two alleles
 - We find this in human _____ blood typing
 - There are _____ alleles: A, B, and O
 - A and B are _____, O is _____

Beyond Mendel: Epistasis

- Sometimes, more than one _____ will have an effect on a trait (“_____”)
- One gene pair seems to affect how another gene pair is _____
- This is seen in _____ hair color, where one gene pair may _____ the affects of another pair
- This leads to many different _____

Beyond Mendel: Pleiotropy

- Sometimes, a single gene affects _____ unrelated aspects of _____
- The first discovered case of this was the _____ gene
 - This causes an abnormal form of _____, making the RBCs crescent shaped (_____)
 - The same gene gives immunity to _____ (_____)

Beyond Mendel: Environmental Influence

- Many times, the _____ (external or internal) may affect how a gene is _____
- _____, diet, _____, and more may change the _____ to which a gene is expressed
- This has been seen in _____ color, _____ color, height, and other traits