

16-1 Genes & Variation

The background of the slide features a gradient from blue at the top to dark blue at the bottom. Overlaid on this are several thick, parallel diagonal stripes in a lighter shade of blue, running from the upper left towards the lower right.

Darwin's Ideas Revisited

- **Darwin Didn't Know How Heredity Worked**
 - **Mendel Published In 1860's**
 - » **Importance Not Realized Until 1900's**
- **Darwin Could Not Explain**
 - **Source Of Variation**
 - **How Traits Passed Generation To Generation**

Gene Pools

■ Population

- A Collection Of Individuals Of The Same Species In A Given Area

■ Gene Pool

- The Combined Genetic Information Of All The Members Of A Particular Population

Gene Pools

■ Relative Frequency

- Refers To Alleles
- The Number Of Times That Allele Occurs In A Gene Pool
- Usually Expressed In Percents

Sources of Genetic Variation

Key Concept

The Two Main Sources Of Genetic Variation Are **Mutations** And The **Genetic Shuffling** That Results From Sexual Reproduction

Mutations

- **Equals Any Change In The Sequence Of Nucleotides In DNA**
 - **Mistakes In Replication**
 - **Radiation**
 - **Chemicals**
- **Can Affect Small Sections Or Complete Chromosomes**

Mutations

- **Do NOT Always Affect Phenotype**
 - **Change From GGA to GGU Still Codes For Glycine**
 - **Each Mutation Must Be Judged For Its Affect On An Organisms Fitness.**

Gene Shuffling

- **MOST Inheritable Differences Are The Result Of Gene Shuffling That Occurred In The Parents, During Meiosis (Gamete Production)**
 - 23 pairs of human chromosomes can produce **8.4 Million Different Gene Combinations**

Gene Shuffling

- **Crossing Over**

- Further Increase Genetic Variation

- **Sexual Reproduction**

- Produces Many Phenotypes

- Does NOT Change **Relative Frequency** of Alleles

- » You can shuffle a deck of cards but the chance of pulling an Ace is always 4:52

Single Gene & Polygenic Traits

- **Key Concept:**

- **The Number Of Phenotypes Produced For A Given Trait Depends On How Many Genes Control The Trait**

Single Gene & Polygenic Traits

■ Single-Gene Trait

- Widow's Peak**
- Controlled By One Gene And Is Expressed By Only Two Alleles**
- Only Two Phenotypes Possible**
 - » You Have It (Dominate, ~35%)**
 - » Or.....You Don't**

Single Gene & Polygenic Traits

■ Polygenic Traits

- Controlled By More Than One Gene**
- Most Traits Are Polygenic**
- Genes With Multiple Alleles Are Common**