

# Evolution Versus Genetic Equilibrium

- If allele frequencies in a population do **not change**, the population is in **genetic equilibrium**.
- **Genetic Equilibrium = NO Evolution**

# The Hardy-Weinberg Principle

- According to the **Hardy-Weinberg principle**, five conditions are required to **maintain genetic equilibrium**:
  1. **Large population**
  2. **Random mating**
  3. **NO migration**
  4. **NO natural selection**
  5. **NO mutations**

“Large Random MnM”

# Condition 1: Large Population

- Genetic drift can cause changes in allele frequencies in small populations.
- Genetic drift has less effect on large populations.
- **Large population size helps maintain genetic equilibrium.**

## Condition 2: Random Mating

- All members of the population must have an equal opportunity to produce offspring.  
**Individuals must mate with other members of the population at random.**
- In natural populations, however, mating is not random.



## Condition 3: No Migration

- Individuals who join a population may introduce new alleles into the gene pool.
- Individuals who leave may remove alleles from the gene pool.
- Thus, for no alleles to flow into or out of the gene pool, **there must be no movement of individuals** into or out of a population.

## Condition 4: No Natural Selection

- All genotypes in the population must have **equal probabilities of surviving and reproducing**.
- No phenotype can have a selective advantage over another.

## Condition 5: No Mutations

- If mutations occur, new alleles may be introduced into the gene pool, and allele frequencies will change.
- Thus, for no alleles to flow into or out of the gene pool, **there must be no mutations.**