Evolutionary patterns

- **Special Creation**: All species created independently by a creator.
  - **Problem**: Provides no testable hypotheses and is not supported by empirical evidence
- **Lamarckism**: Simple organisms arise continually through spontaneous generation, subsequently evolve toward a more complex condition
  - Allows for adaptation through inheritance of acquired characteristics
  - **Problems**: spontaneous generation doesn't happen, does not explain nested relationships apparent between organisms
- **Modern evolutionary theory:** All organisms share a single common ancestor, descent with modification accounts for biodiversity
  - Consistent with many lines of evidence, including nested relationships apparent among organisms.

Microevolution: evolution within at or below the species level, typically concerned with evolutionary *processes* (e.g., natural selection, genetic drift)

Macroevolution: evolution at or above the species level, typically with evolutionary *patterns*, (e.g., changes in species diversity, evolutionary relationships among organisms, origin of body plans)

*****Important**:*** Micro- and macroevolution describe patterns and processes at different scales. Microevolutionary processes underpin macroevolutionary patterns.

Sources of phenotypic difference

- **Environmental**
  - Different phenotypes are the result of differences in environments where individuals developed
- **Genetic**
  - Different phenotypes are the result of differences in the genotypes individuals have

Remember house sparrow in North America as an example of evolutionary change

Evolution

Change in the *genetic composition* of a *population* over time.

Genetic composition: the genotypes present and their frequencies

Population: a group of individuals in a single place that can interbreed

Population genetics

Mendelian genetics: Predict the genotype of offspring given parental genotypes

Population genetics: Predict the genotypic composition of offpring population given genotypic composition of parental population

Hardy-Weinberg

1. Mating occurs at random *with respect to genotype at the particular locus*.
2. No differences among genotypes in survival or fecundity.
3. Population size is infinite (very large, so we can ignore random fluctuations).
4. No input of new genetic material.

Be able to:

- Calculate allele frequencies, genotype frequencies
- Calculate Hardy-Weinberg expectations
- Interpret deviations from Hardy-Weinberg