

## **OBSERVATIONS & INFERENCES OF DARWIN'S THEORY OF NATURAL SELECTION**

Earnst Mayr dissected Darwin's theory into 3 inferences and 5 observations:

**OBSERVATION #1:** All species have such great potential fertility that their population size would increase exponentially if all individuals that are born reproduced successfully.

**OBSERVATION #2:** Populations tend to remain stable in size, excepting seasonal fluctuations.

**OBSERVATION #3:** Environmental resources are limited.

**INFERENCE #1:** Production of more individuals than the environment can support leads to a struggle for existence among individuals of a population, with only a fraction of offspring surviving each generation.

**OBSERVATION #4:** Individuals of a population vary extensively in their characteristics; no two individuals are exactly alike.

**OBSERVATION #5:** Much of this variation is heritable.

**INFERENCE #2:** Survival in the struggle for existence is not random, but depends in part on the hereditary constitution of the individuals. Those individuals whose inherited traits best fit them to their environments are likely to leave more offspring than less fit individuals.

**INFERENCE #3:** This unequal ability of individuals to survive and reproduce will lead to a gradual change in a population with favorable characteristics accumulating over the generations.

### ***Summary of Darwin's theory:***

Natural selection is differential success in reproduction (unequal ability of individuals to survive and reproduce)

Natural selection occurs through an interaction between the environment and the variability inherent among the individual organisms making up a population.

The process of natural selection is the adaptation of populations of organisms to their environment.

## *Comparative Biology*

Comparison of any feature of an organism ... to that feature found in other organisms.

Includes morphology, anatomy, embryology/development, DNA/genetics

Example: Mammalian Arms

Dogs and cats (front "legs")

Humans (arms)

Whales (flipper)

Bats (wings)

All of these are different, but have the same arrangement of structures, i.e., the same development, bones, muscles, nerves, vasculature, all of which suggest common ancestry.

Shared features (even if modified) are called homologies ("homologs")

Similar features that do **not** represent the same structures are analogies ("analogs")

e.g., foreleg of dog, hind leg of cat

e.g., wing of bat, wing of insect (wing of bird also not homologous)