

# Biology Exam 1 Study Guide

## Lecture 1 → Introduction to Biological Science

### Tree of Life

- Domains
  - Eukarya → visible life
    - Split into animals and plants
    - Very small portion
  - Bacteria → single cell
    - Make up most of life's branches
    - Symbionts that evolved into mitochondria and chloroplasts were eubacteria
  - Archaea → original domain of life
    - More closely related to eukaryotes than eubacteria, first branch of life
    - Basic split between archaea and bacteria
- Candidate phyla radiation: Single species have been identified, each identifies an entire phylum which is yet to be understood - pioneer species (tree is dominated by new species that scientists have never seen before)
- Species disappearing faster than can be recovered
- Eukaryotes and archaea are most closely related branches

### Destruction and Mass Extinction

- One million species face imminent extinction because of humans
- Recent past → >50% vertebrates/>75% flying insects lost in the past <50 years
- Critically threatened → >40% amphibians, >30% plants/corals/sharks, >25% mammals
- Populations and extinctions have increased

### Theory of Evolution

- Evolution: all life on earth evolved from a common ancestor, most properties within cells work in the same way, the change in gene distribution over time within a population
- Theory: a very well substantiated idea that explains many overlapping phenomena at once, wide-ranging, strongest. Not a hypothesis
- Darwin: species arise through random mutation and natural selection for fitness
- Evidence (fewer than 40% of Americans believe in evolution)
  - fossil record shows conservation of homologous structures
  - Molecular proof: same DNA and RNA protein in cells
  - Homologous function in hands and fins → evolved similar mechanisms in appendages
- Scopes Monkey Trial
  - Scopes taught evolution illegally; resulted in Butler Act → forbid teaching evolution in TN
- Endosymbiont theory
  - Single composite cell of greater complexity could evolve from two or more separate simpler living cells in a symbiotic relationship

### Year of Earth's History

- 1 Jan: earth formed 4.54 bya by acceleration of material from the solar nebula via gravitational collapse, conditions were incompatible with life, bombarded with asteroid-sized meteors for 800 million years
- 4 Mar: by 3.8 bya bombardment had slowed, Earth had cooled to lower the temps "compatible" with life



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