AP Biology Summer Assignment (2022-2023)

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Instructions

This assignment will be due at the end of the first week of school. We will have some brief time (1-2 weeks) to review before you get tested on the material. DO NOT wait until September to start this assignment. You will fall behind before the class even starts.

Textbook: Campbell, Reese, Ninth Edition-Biology
Reading Guides and textbooks should be picked up from Ms. Bawa in S237

Assignments: Animal Behavior and Evolution Units

Animal Behavior Unit

- Read Chapter 51 – *Animal Behavior*
- Complete the Chapter 51 Reading Guide
- Quiz on first day of second week of school

Evolution Unit

- Read Chapter 22 – *Descent with Modification*, Chapter 23 – *Evolution and Populations*, Chapter 24 – *The Origin of Species*, and Chapter 25 – *The History of Life on Earth*
- Complete the Reading Guides for **EACH** Chapter (22 – 25)
- Test during 2nd full week of school

Below is an outline of the concepts from these two units. As you read, make sure to also review the examples associated with these concepts. You will be responsible for understanding the concepts and the examples.

Animal Behavior

- Behavior
- Niko Tinbergen's 4 Big Questions
    - Proximate Causation (How?)
        - *What causes the behavior?*
            - Sign stimulus → Fixed Action Patterns
            - Environmental cues → Migration
            - Behavioral rhythms (Circadian, Circannual) → Other behaviors (sleeping, migration, hibernation, breeding, courtship, reproduction)
            - Animal behaviors (signals: visual, chemical/pheromones, tactile, auditory) → other animal behaviors
        - *Does experience affect the behavior?*
            - Nature vs. Nurture
            - Nature
                - Innate behavior
                    - Fixed Action Pattern
                    - Stimulus-Response Chain
                    - Response to Pheromones

- Nurture
    - Learning
        - 4 Major Types of Learning
            - Imprinting
                - Sensitive Period
            - Spatial Learning
                - Cognitive Maps
                - Associative Learning
                    - Classical Conditioning
                    - Operant Conditioning
            - Cognition (Problem Solving)
            - Social Learning
                - Culture
- Ultimate Causation (Why?)
    - *How does the behavior enhance reproductive success?*
        - Foraging Behavior (Optimal Foraging Behavior)
        - Mating Behavior
            - Promiscuous
            - Monogamous
            - Polygamous (Sexual Dimorphism)
                - Polygamy
                - Polyandry
            - Determined by needs of young and Certainty of Paternity
            - Intersexual vs. Intrasexual Selection
    - *How has the behavior evolved over time?*
        - Inclusive Fitness
            - Altruism
                - Hamilton's Rule
                    - Kin Selection
                - Reciprocal Altruism

Evolution and the History of the Earth

- Important people in evolution
- Darwin and Natural Selection
    - Evidence for Evolution by Common Descent
        - Direct Observations
        - Homology
            - Anatomical Homologies
                - Homologous Structures
                    - Vestigial Structures
                - Analogous Structures
            - Molecular Homologies
        - Fossil Record
            - Derived Traits
            - Ancestral Traits
        - Biogeography
            - Continental Drift
            - Climate
            - Endemic Species
    - Hardy-Weinberg Equilibrium (equation!)

        - Conditions:
            - Random Mating
                - No Sexual Selection
            - No Mutations
            - No Gene Flow
            - No Genetic Drift
                - Founder Effect
                - Bottleneck Effect
            - No Natural Selection
- Modes of Natural Selection
    - Adaptive Evolution
        - Directional
        - Stabilizing
        - Disruptive
    - Sexual Selection: Non-Adaptive Evolution
        - Intersexual Selection
            - Male Showiness (Sexual Dimorphism)
        - Intrasexual Selection
- Mechanisms to preserve variation
    - Diploidy
    - Balancing Selection
        - Heterozygote Advantage
        - Frequency-Dependent Selection
- Definition of a Species
    - Biological Species Concept
    - Morphological Species Concept
    - Ecological Species Concept
    - Phylogenetic Species Concept
- Speciation
    - Requires:
        - Reproductive Isolation
            - Prezygotic Barriers
                - Habitat, temporal, behavioral, mechanical, gametic
            - Postzygotic Barriers
                - Reduced hybrid viability, reduced hybrid fertility, hybrid breakdown
    - Allosteric Speciation
    - Sympatric Speciation
        - Polyploidy
            - Autopolyploidy
            - allopolyploidy
        - Habitat differentiation
        - Sexual Selection
    - Study Speciation in Hybrid Zones
        - Reinforcement of barriers
        - Fusion of species
        - Stability
    - Rate of Speciation
        - Punctuated Equilibrium
        - Gradualism

MICROEVOLUTION ↑

MACROEVOLUTION ↓

- History of the Earth
    - Lithosphere, Atmosphere, Hydrosphere, Biosphere
- Non-life → Life (Protocells)
    - Miller Urey Experiment and the Primordial Soup Hypothesis
- Fossils
    - Relative Dating
    - Radiometric Dating
- Geologic Time Scale
    - Major Events
        - Photosynthesis → Aerobic Respiration → Ozone Layer
        - Endosymbiont Theory
        - Cambrian Explosion
        - Plate Tectonics
        - Mass Extinctions → Adaptive Radiations
- Small genetic changes resulting in extreme body changes over time
    - Changes in Rate of Timing of Development
        - Heterochrony
    - Changes in Spatial Pattern
        - Homeotic Genes