

# Bio Review

## Exam 1

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- Least to most complex:
  - Individual, population, community, ecosystem, biosphere
- Evolution is best defined as change in allele frequency over time
- Rabbits eat their own fecal matter:
  - As herbivores they maximize nutrient uptake from difficult to digest plant material
- Deep root systems are a sign of periods of little rainfall and soils that erode easily
- **Ectotherm**: dependent on **external** sources of heat (usually have slow metabolic rate as a result)
- Endotherm: maintains its body at a metabolically favorable temperature
- Only marine fish "drink"
- Analogous structures: structures in different species having similar or corresponding function but not from the same evolutionary origin
- Homologous structures: structures derived from a common ancestor or same evolutionary or developmental origin
- "Aspect" is the direction that a slope faces

## Population growth

r: rate of natural increase

k: carrying capacity of a population

## Exam 2

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- Morphological Species Concept: subjective, classified by appearance
- Ecological Species Concept: filling a niche.

- Phylogenetic Species Concept: Smallest group of individuals with a common ancestor
- Sympatric speciation: new species evolve from a single ancestral species while inhabiting the same geographic region
- Order of events that may have led to an abiotic origin of living organisms
  1. Formation of organic molecules from inorganic precursors
  2. Formation of macromolecules
  3. Formation of self-replicating molecules
- Eucaryota contain nuclei
- Punctuated equilibrium: evolutionary change happens in rapid bursts
- RNA can:
  - Self-replicate
  - Have catalytic activity like an enzyme
- The theory of endosymbiosis has been proposed to explain how some organelles came to exist in eukaryotes

## Hardy-Weinberg example

Genotype	#
100/100	65
100/200	35
200/200	50

$$p = \text{freq of 100} = ((65 * 2) + 35) / 300 = .55$$

$$q = \text{freq of 200} = ((50 * 2) + 35) / 300 = .45$$

Expected frequencies:

$$100/100 = p^2 = 0.303$$

$$100/200 = 2pq = 2(.55)(.45) = .495$$

$$200/200 = q^2 = .2025 = .203$$

Expected numbers:

$$100/100 = 0.303 * 150 = 45.45$$

$$100/200 = .495 * 150 = 74.25$$

$$200/200 = .203 * 150 = 30.45$$

## Post-exam 2

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### Plants

- Bryophytes:
  - **Types of plants:**
    - Liverworts
    - Hornworts
    - Mosses
  - Non-vascular
  - Have flagellated sperm (Require water for fertilization as a result)
  - Haploid gametophyte is the dominant life stage
  - Have macrophylls (small, simple leaves on some ferns)
  - Seedless
- Bryophytes produce sporangia which have the advantages of:
  - Tolerant dessication (they can survive in arid periods)
  - Allow dispersal to new environments
- Angiosperms:
  - Monocots
  - Eudicots
- Fungi:
  - Have the **mycota** and **mycetes** suffix sometimes (usually)

- Heterosporous: produce two types of spores (micro/macro)
- Gynosperms and agiosperms are heterosporous
- Angiosperms flower
- Gynosperms/angiosperms produce seeds and gametophyte are typically microscopic
- Pteridophytes, gynosperms, angiosperms all are sporophyte dominant and have vascular tissue
- Seed plant lifecycle: sporophyte leads to meiosis, megametophyte produces eggs while the microgametophyte produces sperm, fertilization occurs, go back to sporophyte
- Seed/sporophyte are diploid ( $2n$ ), sperm/eggs/megaspores/microspores are haploid ( $1n$ ).

#### Plant structures:

- Gametangia
- Archigonium
- Antheridium
- Apical meristems
- Gametophyte
- Sporophyte
- Microphylls and megaphylls
- Xylem and phloem
- Microspores and megaspores
- Microgametophytes
- Seeds

#### Fungi structures:

- Hyphae or Mycelia
- Sporocarp
- Mycorrhizal fungi

## Animals

- Porifera (sponges):  
  - . . . . .

- Lack of specialized tissues
- Asymmetric
- Ctenophora and Cnidaria (comb jellies/jellies)
  - Specialized tissues present
  - Radially symmetric
- Lophotrochozoa:
  - Most bilaterally symmetric
  - Two discrete groups joined based on molecular evidence
  - One group has a lophophore (crown of cilia used in feeding)
  - Other group has a distinctive developmental stage, **trochophore larva**
  - Some members of the group lack both of these distinctive features
  - Phylum Platyhelminthes (flatworms)
    - Acoelomate
    - Gas exchange and elimination of wastes by diffusion
    - Most with single opening associated with gastrovascular system
    - Free living and parasitic forms
  - Phylum Mollusca (snails, slugs, oysters, clams, octopuses, and squids)
    - Simple nervous system present
    - Body has three main parts
      1. Muscular foot used for movement
      2. Visceral mass with internal organs
      3. Mantle that secretes shell
    - Cephalopods (octopuses and squids) have a closed circulatory system
  - Phylum Annelida (segmented worms)
    - Digestive system with mouth and anus
    - Closed circulatory system
    - Simple nervous system with simple "brain"
- Ecdysozoans:
  - Most possess a tough outer covering or cuticle which they shed as they grow

(molting is called ecdysis)

- Phylum Nematoda (round worms)
  - Widespread in water, soils, plant tissues, animal tissues
  - Extremely abundant
  - Free living and parasitic forms
- Phylum Arthropoda (insects, spiders, crustaceans)
  - Most diverse
  - Segmented bodies and jointed appendages
  - Some appendages specialized
  - Exoskeleton layers of protein and chitin
  - Open circulatory system
  - Respiration through tracheal tubes
- Deuterostomes
  - Phylum Echinodermata (sea stars/urchins)
    - Unique water vascular system
  - Phylum Chordata (chordates: fishes, amphibians, reptiles, mammals)
    - Notochord -- flexible rod for support (may be replaced by vertebrae)
    - Dorsal, Hollow nerve cord
    - Pharyngeal slits or clefts
    - Muscular post-anal tail