Honors Biology – Unit 5 – Chapter 34
"THE BIOSPHERE: AN INTRODUCTION TO EARTH'S DIVERSE ENVIRONMENTS"

1. aquatic biomes

    - photic zone
    - aphotic zone

2. 9 terrestrial (land) biomes

    - tropical rain forest
    - savannah (tropical grassland)
    - desert
    - chaparral
    - temperate grassland
    - temperate deciduous forest
    - coniferous forest (taiga)
    - tundra
    - alpine ("high mountains" and "polar ice")

Honors Biology – Unit 5 – Chapter 37
"COMMUNITIES AND ECOSYSTEMS"

1. ecological niche:

    - fundamental niche vs. realized niche
    - competition

2. energy pyramid, trophic levels, food chains, food webs

3. producers, herbivores, carnivores, consumers, decomposers

4. 10% rule

5. "energy flows and matter cycles"

6. cycles in the environment:

    - energy
    - carbon
    - phosphorus
    - nitrogen
    - water

7. species diversity

8. succession:

    - primary succession vs. secondary succession
    - lake succession
    - pioneer species vs. climax community

Honors Biology – Chapter 34 Word Roots
"THE BIOSPHERE: AN INTRODUCTION TO EARTH'S DIVERSE ENVIRONMENTS"

a- = without; **bio-** = life (*abiotic factor:* the non-living chemical and physical components of an ecosystem)

-photo = light (*aphotic zone:* the region of an aquatic ecosystem beneath the photic zone, where light does not penetrate sufficiently for photosynthesis to occur)

bio- = life (*biome:* a defined area of ecologically similar communities of organisms; *biosphere:* the part of the Earth inhabited by life; *biotic factor:* a living component of an ecosystem)

bentho- = the depths of the sea (*benthic realm:* a seafloor, or the bottom of a freshwater lake, pond, river, or stream)

estuar- = the sea (*estuary:* the area where a freshwater stream or river merges with the ocean)

inter- = between (*intertidal zone:* the shallow zone of the ocean where land meets water)

pelag- = the sea (*pelagic realm:* all of the open-water areas of an ocean, excluding the intertidal zone)

perman- = remaining (*permafrost:* a permanently frozen stratum below the arctic tundra)

-photo = light (*photic zone:* the region of an aquatic ecosystem where light penetrates and photosynthesis occurs)

phyto- = a plant (*phytoplankton:* algae and photosynthetic bacteria that drift passively in aquatic environments)

zoo- = animal (*zooplankton:* animals [heterotrophs] that drift freely in aquatic environments)

Honors Biology – Chapter 37 Word Roots
"COMMUNITIES AND ECOSYSTEMS"

a- = without; **bio-** = life (*abiotic reservoir:* a part of an ecosystem where a chemical, such as carbon or nitrogen, accumulates or is stockpiled outside of living organisms)

geo- = Earth (*biogeochemical cycle:* any of the various chemical circuits that involve both biotic and abiotic components of an ecosystem)

de- = from, down, out (*decomposer:* prokaryotes and fungi that secrete enzymes that digest organic material and break it down into inorganic forms)

detrit- = wear off (*detritus:* dead organic matter); **-vora** = eat (*detritivore:* an organism that consumes organic wastes and dead organisms)

herb- = grass; **-vora** = eat (*herbivory:* the consumption of plant material by an animal)

quatr- = four (*quaternary consumer:* an organism that eats tertiary consumers; the fourth step on the food chain)

terti- = three (*tertiary consumer:* an organism that eats secondary consumers; the third step on the food chain)

PROPERTY OF:

HONORS BIOLOGY – UNIT 5 – CHAPTERS 34 & 37 NOTES

THE BIOSPHERE & ECOSYSTEMS

Terrestrial Ecosystems

- temperate = mild temperatures, different seasons
- tropical = hot, long summers; near the equator
- deciduous = trees that lose their leaves in the fall
- coniferous = trees that do not lose their leaves in the fall (evergreen)
- TROPICAL RAIN FOREST
  - climate: hot and rainy
  - precipitation: 100 inches per year
  - location: South America, Africa, India
- SAVANNAH (TROPICAL GRASSLAND)
  - climate: hot, alternating wet/dry seasons
  - precipitation: 35-60 inches per year
  - location: South America, Africa
- DESERT
  - climate: very dry and hot
  - precipitation: 8 inches per year
  - location: Africa, Asia, southwestern US, Australia, Middle East
- TEMPERATE GRASSLAND
  - climate: dry, hot summers and cold winters
  - precipitation: 5-25 inches per year
  - location: midwestern US, Russia, Europe, Australia
- CHAPARRAL
  - climate: dry, hot summers and mild winters
  - precipitation: 10-17 inches per year
  - location: coastal areas near the Mediterranean Sea, California, South Africa
- TEMPERATE DECIDUOUS FOREST
  - climate: warm summers and cold winters
  - precipitation: 30-100 inches per year
  - location: Europe, US east of the Mississippi River
- CONIFEROUS FOREST (TAIGA)
  - climate: long, cold winters and short, cool summers
  - precipitation: 10-25 inches per year
  - location: Canada, northern Europe, Russia
- TUNDRA
  - climate: long, cold winters and short, cool summers
  - precipitation: 10 inches per year
  - location: northern Canada, Siberia
- ALPINE
  - climate: long, cold winters and short, cool summers
  - precipitation: 30-40 inches per year
  - location: North/South Poles, mountain tops

Aquatic Biomes

- photic zone = contains light (upper layers)
- aphotic zone = does not contain light (lower layers)
- little temperature variation (unlike land biomes)
- categorized by light intensity, oxygen and carbon dioxide availability, and nutrient availability

Niche

- niche = an organism's role in the environment
- niche can include: climate, when it feeds, when it mates, diet, sleep pattern, etc.
- fundamental niche = the theoretical niche in which the organism has access to everything it needs
- realized niche = the actual niche based on the fact that certain resources may not be available (due to competition)
- no two organisms can occupy the same realized niche
- competition occurs when two organisms try to occupy the same niche

Energy in the Environment

- energy pyramid:
  producer → herbivore →primary carnivore →secondary carnivore → tertiary carnivore
  -- OR --
  producers → 1° consumer → 2° consumer → 3° consumer → 4° (quaternary) consumer
- bottom of pyramid: most amount of energy, greater # of organisms
- top of pyramid: least amount of energy, least # of organisms
- sun = original source of energy for any food chain
- producer = organism that produces its own food (autotroph)
- consumer = organism that cannot produce its own food (heterotroph)
- decomposers = organisms that break down dead material, feed at every trophic level (except plants)
- trophic level = each level on the pyramid or food chain
- top carnivores are often (but not always) larger and produce fewer offspring
- there are usually fewer organisms as you move up the food chain

Ten Percent Rule

- 10% rule = at least 90% of the energy is lost moving up each trophic level
- as you move up the pyramid, there is less energy available
- energy is lost due to daily functions (EX: cellular respiration, feces, heat energy)
- EX: 1 → 2
  "the energy goes from 1 to 2"
  "#2 consumes #1"
- EX: chicken feed → chicken → Carlos →Lion → Jenny
  4000 cal 400 cal 40 cal 4 cal 0.4 cal
- Why are food chains usually limited to 4 or 5 trophic levels?

Succession

- a regular pattern of changes over time of the species in an ecosystem
- pioneer species: the first species to colonize an area
- climax community: the final, stable community in an ecosystem
- Succession starts with bare land.
- Primary succession starts with bare land and rock (no soil).
- Secondary succession starts after a forest experiences a disruption, such as a forest fire. Soil is already present.
- Lake succession starts with a lake that dries up, fills with soil, and becomes flat land.

Hypothetical Example of Succession

EX: A forest burns down.

1 month =	weeds, insects, rats
1 year =	grass, insects, large rodents
5 years =	shrubs, saplings, small birds, rabbits, squirrels
20 years =	small trees, squirrels, deer, hawk
200 years =	large forest, bears, fox, all trophic levels (complete food chain)

Pioneer Species

- small animals
- mate earlier in life
- more offspring
- less stable (cannot easily adapt to changes)
- missing some trophic levels (top levels of food chain are absent)

Climax Community

- larger animals
- mates later in life
- less offspring
- more stable (can easily adapt to changes)
- contains all trophic levels (from producers to top carnivores)