

PROPERTY OF:

BIOLOGY – UNIT 5 – CHAPTER 3 NOTES

THE BIOSPHERE

Levels of Organization in Biology

13. ** Biosphere = all living things on Earth
12. ** Ecosystem = all the communities in a large area; includes biotic and abiotic factors
11. ** Community = group of all the different species in an area
10. ** Population = group of organisms of the same species in an area
9. ** Organism = one individual organism
8. Organ System
7. Organ
6. Tissue
5. Cell
4. Organelle
3. Molecule
2. Atom
1. Subatomic Particle

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?

PROPERTY OF:

BIOLOGY – UNIT 5 – CHAPTER 4 NOTES

ECOSYSTEMS AND COMMUNITIES

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

Ecological 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

Species Interactions

- A. Co-Evolution = when species evolve in response to each other (+/+ or +/-)
- EX. 1: tough leaves & herbivores
 - EX. 2: rose stems & herbivores
 - EX. 3: flowering plants & insects
 - EX. 4: Rafflesia & flies
 - EX. 5: poison ivy & herbivores
- B. Symbiosis = a close, long-term relationship between 2 or more different species
1. Parasitism = when one organism lives or feeds off of another organism (+/-)
 - EX. 1: tapeworm & human intestines
 - EX. 2: HIV & T-cell (immune system – white blood cell)
 2. Commensalism = when one organism greatly benefits, but the other is not affected (+/0)
 - EX. 1: barnacles & gray whale
 - EX. 2: shrimp & sea anemone
 3. Mutualism = when all participating species benefit (+/+)
 - EX. 1: E. Coli & human intestines
 - EX. 2: fungi & algae
- C. Competition = when organisms fight over a specific resource or limiting factor (-/- or +/-)
- EX. 1: two female peacocks trying to attract the male peacock
 - EX. 2: two dogs fighting over food or territory
- D. Predation = when one animal eats another animal; the predator-prey relationship (+/-)
- EX. 1: a bird flies down and eats a worm
 - EX. 2: a shark eats a fish

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)