

- 2) **consumers (heterotrophs)**—organisms which feed on organic material/living prey
 - a) types of consumers
 - **primary (1°) consumers**—herbivores—organisms which feed on plants/autotrophs/producers
 - **secondary (2°) consumers**—organisms which feed on the primary consumers
 - there can be higher levels: **tertiary (3°)**, etc.; usually 3 or 4 levels
 - b) “diet” terms
 - **carnivores**—animal-eaters
 - **herbivores**—plant-eaters
 - **omnivores**—plant-and-animal eaters
 - c) predator-prey relationships
 - **predator**—organism doing the hunting and feeding
 - **prey**—organism which is fed upon
 - d) parasite-host relationships
 - **parasite**—organism feeding off another organism, weakening it but not usually killing it
 - **host**—organism which is fed upon
 - viruses and bacteria are pathogens but are considered to be types of parasites
- 3) **decomposers & detritus feeders**—organisms which feed on dead organic material: dead organisms and/or their products
 - a) **detritus**—dead plant and animal material
 - b) **primary detritus feeders**—organisms feeding directly on detritus
 - c) **secondary detritus feeders**—organisms feeding on 1° detritus feeders

C. trophic relationships

- 1) **food chain**—a simple, linear arrangement of feeding relationships
GRASS eaten by ANT eaten by LIZARD eaten by SNAKE
- 2) **food web**—complex arrangement of food chains; all possible feeding relationships in an area
- 3) **trophic levels**—feeding levels; usually 3 or 4
 - a) trophic levels must begin with producers
 - b) **biomass**—total mass of organisms; can be estimated at each trophic level
 - c) **biomass pyramid**—graphic representation of biomass at different levels
 - d) **10% rule**—approximately 10% of the biomass of a trophic level goes to the next level
 - * most of the food eaten by consumers is metabolized for energy, not incorporated into the body mass
 - * much of the producers’ biomass goes directly to the decomposers

D. nonfeeding relationships

- symbiosis**—a relationship between members of different species
- 1) **mutualism**—mutually beneficial to both organisms

(lichens—algae and fungi)

- 2) **commensalism**—*one organism benefits, but the other is unchanged* (fish hiding in coral reefs)
- 3) **parasitism**—*one organism benefits, the other is harmed* (tapeworm infestation of a puppy)

E. competitive relationships

- 1) **habitat**—*the area in which an organism is adapted to live*
- 2) **ecological niche**—*the role or job an organism plays in its environment; where it lives, what it eats, when it eats, where it eats, etc.*
- 3) *two species cannot occupy the same niche—competition will drive one out—but niche overlap is possible*
- 4) **competitive exclusion**—*species becoming extinct as a result of competition*

F. abiotic factors

- 1) two types: conditions and resources
 - a) **conditions**—*aspects of the environment* (temperature, humidity, salinity...)
 - b) **resources**—*factors consumed by organisms* (water, chemicals...)
- 2) optimum, zone of stress, range of tolerance
 - a) optimum—the best (circumstances, environment...)
 - **optimal range**—*various conditions in which the organism will thrive*
 - b) **range of tolerance**—*the span of conditions in which the organism is able to live*
 - **limits of tolerance**—high and low limits
 - **zones of stress**—between optimal range and each limit
- 3) Law of Limiting Factors
 - a) **limiting factor**—*anything limiting growth*
 - b) **Law of Limiting Factors**—*any one factor outside the optimal range will cause stress, possibly limiting growth, or even survival*
 - c) **synergistic effects (synergisms)**—*two or more factors which interact in a way that produces a greater total impact than each would separately*

2.3 Notes

- III. Global Biomes Table 2-3: MAJOR TERRESTRIAL BIOMES - review
 - A. **climate**—*average temperature and precipitation each day throughout the year*
 - B. **biomes**—*large ecosystems of the world*
examples of *terrestrial (land) biomes*:
 - 1) *desert*
 - a) warm desert/semidesert
 - b) cold desert/semidesert
 - 2) *tundra*
 - a) arctic tundra (near Arctic Circle; North Pole)
 - b) alpine tundra (high mountaintops)
 - permafrost—permanently frozen subsoil

- 3) *grassland*
 - a) *prairie (temperate grassland)*
 - tall grass prairie (Eastern Midwest U.S.)
 - short grass prairies (steppe; Rocky Mtn. areas)
 - b) *savanna (tropical grassland)*
 - 4) forest
 - a) *coniferous forest* (needle and cone-bearing trees)
 - b) *deciduous forest* (temperate forest; trees shedding leaves seasonally)
 - c) *tropical rainforest*
- C. microclimate and other abiotic factors
- 1) **microclimate**—conditions in a *localized area* of a biome
 - 2) some abiotic factors
 - a) soil contents / types of soil separates (sand, clay, silt)
 - b) topography—the layout of the land; elevations and depressions
 - c) temperature
 - d) precipitation / water quality
 - e) available living space
 - f) pH
 - g) light intensity / shade...
- D. biotic factors
- 1) predator / prey ratio
 - 2) amount of plant growth (for food or for shelter)...
- E. physical barriers
- 1) mountain ranges
 - 2) bodies of water

2.4 Notes

IV. The Human Factor

A. Paleolithic hunter-gatherer society

- 1) gather natural food
- 2) hunt wild animals for food
- 3) *nomadic—roaming around*
- 4) *low impact on the environment; low population density*

B. Neolithic revolution ~12,000 yrs ago in the Fertile Crescent—the advent of agriculture changed how people lived

- 1) agricultural society—planting crops (*invention of the plow*)
- 2) *domestication of animals*
- 3) specialized jobs among people
- 4) *larger populations living in settlements*

C. Industrial revolution— 1800s (**natural system** → **human system**)

- 1) industrial society
- 2) machines play a large role
- 3) *high demands for resources and energy*
- 4) advances in technology
- 5) larger population size
- 6) severe environmental damage

D. Environmental revolution—the quest to establish sustainable practices in all that we do, through *sustainability, stewardship, and sound science*