

- 1 **Microbial Ecosystems**
Chapter 23
- 2 **23.1 Ecological Concepts**
 - Ecosystem
 - all organisms and abiotic factors in an environment
 - Habitat
 - Portion of ecosystem where microbial community resides
 - An ecosystem contains many different habitats
 - Microbes ~ 50% of all biomass on Earth
- 3 **23.1 Ecological Concepts**
 - Symbioses
 - relationships with other organisms
 - Parasitism
 - Mutualism
 - Commensalism
- 4 **23.1 Ecological Concepts**
 - diversity expressed in two ways
 - Species richness:
 - total number of different species present
 - Species abundance:
 - proportion of each species in ecosystem
 - Both depend on the kinds and amounts of nutrients available
- 5 **23.2 Microbial Ecosystems and Biogeochemical Cycling**
 - Guilds
 - Metabolically related microbial populations
 - interact with macroorganisms and abiotic factors
- 6 **23.2 Microbial Ecosystems and Biogeochemical Cycling**
 - Biogeochemistry:
 - study of biologically mediated chemical transformations
 - result in the recycling of elements to living systems
- 7 **23.3 Environments and Microenvironments**
 - growth of microbes depends on resources and conditions
 - prime niche
 - niche in which that organism is most successful
 - Microenvironment
 - immediate environment of a microbial cell or group of cells
- 8 **23.3 Environments and Microenvironments**
 - microenvironments are subject to rapid change
 - Resources are highly variable many microbes in nature face a feast-or-famine existence
 - Competition and cooperation occur in natural systems
- 9 **23.4 Biofilms: Microbial Growth on Surfaces**
 - Surfaces are important microbial habitats
 - Nutrients adsorb to surfaces
 - Microbial cells can attach to surfaces
- 10 **23.4 Biofilms: Microbial Growth on Surfaces**
 - Biofilms
 - bacterial cells enclosed in adhesive matrix excreted by cells (polysaccharides)
 - trap nutrients
 - help prevent detachment of cells

- 11 **23.5 Biofilms: Advantages and Control**
- Self-defense
 - resist physical forces that sweep away unattached cells
 - resist phagocytosis by immune system cells
 - resist penetration of toxins (antibiotics)
 - Allows cells to remain in a favorable niche
 - Allows bacterial cells to live in close association with one another
- 12 **23.5 Biofilms: Advantages and Control**
- medical and dental conditions
 - periodontal disease
 - kidney stones
 - Tuberculosis
 - Legionnaire's disease
 - Staphylococcus infections
 - industrial settings
 - slow the flow of liquids through pipelines
 - accelerate corrosion of inert surfaces
 - Few highly effective antibiofilm agents are available
- 13
- Work in groups of 2-3 to research one of the following microbial ecosystems your group will then present your findings to the class:
 - Rivers & Streams
 - Soil
 - Plants
 - Open Oceans
 - Deep Sea
 - Hydrothermal Vents (Ch 24)
 - Root Nodule Symbiosis (Ch 24)