

8/26/14-8/27/14

BIOVERS DIVERSITY- CHAPTER 1

A. BIODIVERSITY - scientific study of all the variety of forms of life

1. Key properties of life

- a. Order
 - i. Highly organized structure ex) sunflower
- b. Reproduction- flowers
 - i. Asexually, sexually, both
 - ii. All organisms replicate themselves (most in variation)
- c. Growth and development
 - i. Cells being replaced (nerve, blood, etc)
 - ii. Repair
 - iii. length
- d. Energy processing/utilization
 - i. Metabolism- total of all chemical reactions in a cell
 1. Different ways: sunlight, blood, other animals, flowers
 - a. Autotrophs- self feeders: sunlight, chemicals, photosynthesis
 - b. Heterotrophs- different feeders, rely on other organism for food
- e. Response to the environment
- f. Homeostasis- the ability to keep a more/less stability of internals
- g. Adaptation- flower shape and structure
 - i. ptarmigan
- h. Form fits function
 - i. Seagulls formed with wings and feathers for function of flying

2. Examples

- a. What distinguishes living organisms from non-living matter?
 - i. Living organisms are characterized by metabolism and reproduction

B. Methods of Science

1. Emergent properties
2. Holism vs. reductionism

C. Biologists

- a. Water crisis
 - i. Cyanobacteria- blue green algae- bloom nutrients
 - ii. Subsurface- runoff drainage
 - iii. Rain garden- mini version of a wetland

D. Levels of biological organizations

- a. Biosphere- all living organisms plus abiotic environment
 - b. Ecosystems- describes organisms living in an area and their interaction with abiotic environment
 - c. Communities- collection of organisms interacting with each other
 - d. Population- group of organisms of the same species living in the same area
 - e. Organisms
 - f. Organs and organ systems
 - g. Tissues
 - h. Cells
 - i. Organelles
 - j. Molecules
 - k. Atoms
- E. Reductionism
- a. Natural objects and processes can be explained by studying their parts (the whole is the sum of its parts)
- F. Holism
- a. Living nature is a scheme of interactions whereby the whole is *more* than the sum of its parts
 - i. Chain reaction of DDT- kills mosquitoes, roaches--- reduces lizards--- reduces cats---increases rats---increases fleas---increase bubonic plague
- G. Scientific method
- a. Hypothesis based inquiry (cause and effect)
 - i. Deduction
- H. Discovery science-
- a. descriptive approach using careful observations and analysis of data
 - i. induction
- I. parallel approaches
- a. science
 - i. make an observation
 - ii. propose an explanation for this observation (develop a hypothesis) and make a prediction based on that hypothesis
 - iii. test the prediction to see if it comes true
 - iv. formulate a new hypothesis, that includes the increased knowledge about the observation
 - b. engineering
 - i. identify the problem
 - ii. propose a tentative solution to the problem
 - iii. test this solution in the form of a model (mathematical, physical, or other) and see if it solves the problem
 - iv. implement the solution in the real system and watch its effectiveness
 - v. collect \$\$\$

- J. Some paradigms in biology
 - a. All organisms are composed of cells, their basic units of structure and function. These cells “do” chemistry
 - b. New properties emerge at each level in the biological hierarchy
 - c. Structure and function are correlated at all levels of biological organization
 - d. Organisms interact with each other, take in energy from their environment and convert it into a useful format
 - e. There is a universal genetic code shared by all organisms and this code transmits information between generations
 - f. Evolution by natural selections result in adaptation
 - i. **Evolution**- changes in genetics over time
- K. Evolutionary adaptation is a product of natural selection
- L. Charles Darwin
 - a. Naturalist
- M. Classifying all diversities
 - a. **Taxonomy**- the method of naming and classifying the diverse forms of life
 - b. **Systematics**- scientific study of the diversity of life
 - c. **Phylogenetic**- study of revolutionary history of a species or group of species
- N. Domains of life
 - a. Domain bacteria
 - b. Domain archaea
 - c. Domain Eukarya

*PG 24-26 REVIEW