Topic 2: Nature of Living Things

SCI141 – Fall 2004

Objectives

- Describe the five characteristics that all living things have in common.

- In order for something to be classified as living, it must meet several criteria.

Metabolism

- All living things require energy for…
- Metabolism describes all of the chemical reactions that occur within an organism that

Metabolism

- Key types of activities:
  - Nutrient uptake
  - **Nutrient processing**
  - Waste removal

Metabolism

- Nutrient Processing
  - Remember, all organisms need energy, so there are two specific types of processes
  - Create energy
  - Release energy

Metabolism

- Creating Energy = Photosynthesis
- Releasing Energy = Respiration

Generative Process

- What does “generative” sound like?

Generative Processes

- Creating new “generations”
- In order to be successful an organism must reproduce.

Generative Processes

- How?
- Reproduction → the actual process of creating a new organism
- Growth → increase in # of organisms
  increase in size of organisms

Generative Processes

- How do you get to a new organism?
- How does an fungus know to become a fungus?
- How does an arm know how to become an arm?

Generative Processes

- Heredity → the passing of genetic material to the offspring of individuals.
- What is the genetic material?

Responsive Processes

- The environment is always changing:
  - Weather
  - Erosion
  - Loss of living spaces
  - Diseases
- Organisms need to adapt to these changes

Responsive Processes

- However, individuals cannot adapt
- Populations adapt

Example

- Giraffes

Responsive Processes

- Picture millions of years ago…
- Trees grow higher
- If you (a giraffe) want to eat the leaves from trees you need a long neck. (or you need to be taller…)

Responsive Processes

- Individuals cannot make their necks longer.
- Some giraffes in the population may have a longer neck:
  - They eat more food, live longer → reproduce better → More giraffes have longer necks

Control Processes

- Individual do have a limited ability to rapid adapt to their surroundings
- Examples

Control Processes

- Goal is Homeostasis → Maintaining a STABLE internal environment
- This could mean:
  - Maintaining balance
  - Being constant
  - Creating differences (but we'll get to this later)

Control Processes

- Control and Integration
  - Involve coordination
    - Nervous System
- Materials Exchange
  - Balancing nutrients

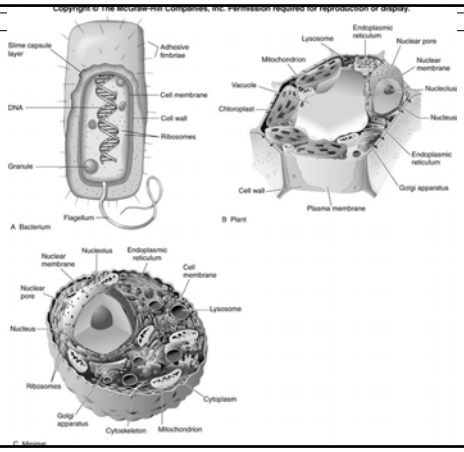
Structural Similarities

- All organisms are built from the same building blocks
- All organisms have similar patterns that they follow

Structural Similarities

- All organisms are composed of cells

Cells → Tissues → Organs → Organ Systems → Organism

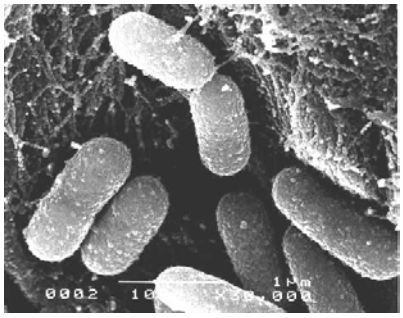


Quick Summary

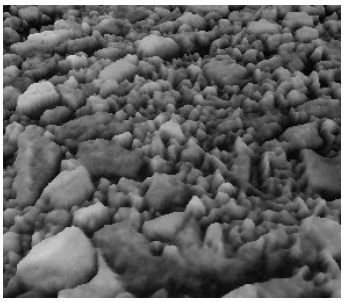
- To be living you must:
  1. Metabolize
  2. Reproduce
  3. Adapt
  4. Maintain balance
  5. Be composed of cells

Let's look at some examples

Humans?



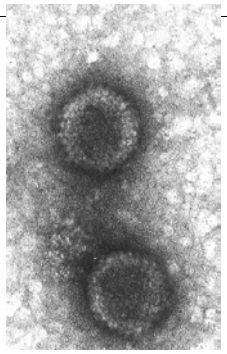
Bacteria?



Rocks?

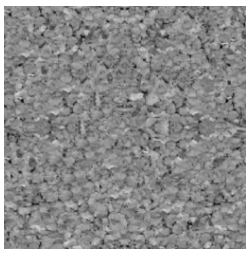
Tulips?

Yogurt?



Viruses?

Computers?



Cork?