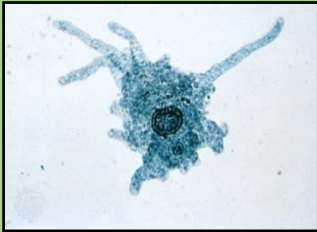


Characteristics of all Living Things

*Living things are referred to as **organisms**. Organisms can be bacteria, protists, fungi, plants, or animals. Even though there is great diversity among all living things, there are certain traits that all organisms share. Listed below are the basic characteristics of all living things. Keep in mind, *for something to be considered living it must demonstrate all of these properties at some stage in the organism's life*. Throughout the following units, we will delve into each characteristic more fully. It also should be noted here that it is a common misconception to believe that viruses are living things. This is not true because *viruses do not carry out the following characteristics of living things*.*



1. All living things must demonstrate CELLULAR ORGANIZATION.

All living things are made up of tiny units called cells. **Cells** are the smallest unit capable of all life functions. Some organisms consist of one cell and are called unicellular organisms, while organisms that consist of many cells are called multicellular organisms. Each type of cell has its own specific structure and function.

2. All living things carry out METABOLISM.

Metabolism is the sum of all chemical reactions carried out in an organism. From the smallest unicellular organism to the most complex multicellular organism, all species have a way to obtain food/energy. All organisms need to use chemical processes to convert the 'food' to energy. Moreover, organisms use chemical processes for other functions as well. Transport, repair, and growth are some of the functions that require



chemical processes. Sometimes, the organism relies on another for its food. In this case, the organism is heterotrophic. Conversely, if an organism can generate its own energy, it is autotrophic. Humans are an example of heterotrophs, while plants are considered autotrophs.

3. All living things must demonstrate HOMEOSTASIS.

Homeostasis is the ability of an organism to maintain a constant internal environment regardless of changes in the organism's external environment. For an organism to survive, it must exhibit successful homeostasis. An example of homeostasis is shivering in cold weather when the weather causes your body temperature to go below 98.6°F. The shivering is caused by the rapid contracting and relaxing of skeletal muscles which produce the "heat" required to reestablish the internal environment or internal temperature of about 98.6°F. When you sweat, your body temperature is above 98.6°F. Sweating is the body's way of releasing water which is where the heat is being stored. Sweating will lower your body temperature back down to 98.6°F where it wants and needs to be. Trying to maintain a body temperature of 98.6°F is a perfect example of HOMEOSTASIS.



4. All living things must have the ability to REPRODUCE.

Reproduction is the process by which organisms make more of their own kind from one generation to the next. All living things come from other living things. Although the processes might involve different steps, all types of cells and organisms do reproduce. Some reproduce asexually where there is no recombination of genetic information and every offspring is identical to the parent. Others reproduce sexually, where the genetic information of the parents is combined, shuffled, and redistributed so that the offspring are not identical to the parent.



5. All living things must demonstrate RESPONSIVENESS.


Responsiveness is the ability of an organism to respond to changes in their environment. The organism's change is referred to as a response and the change in the environment which caused the organism to change is referred to as a stimulus. Plants bending toward sunlight as they grow and birds fluffing their feathers to insulate their body during cold weather are two examples of responsiveness.

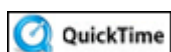


6. All living things must demonstrate HEREDITY.

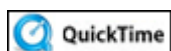
Heredity is the passing of traits from parent to offspring. Inherited traits change over generations in all living things. This generational change in traits is referred to as evolution and is also tied in with adaptation. When an organism changes—physiologically, structurally, or behaviorally—as a survival



<p>response to changes in environment, it is called an adaptation which results in evolution.</p>	
	<p>7. All living things must demonstrate <u>GROWTH</u>.</p> <p>Growth can be observed two different ways. Growth can be in terms of increasing the number of cells which is called <u>Cell Division</u>, or it can be in terms of a particular cell becoming larger which is called <u>Cell Enlargement</u>. Both methods of growth result in the organism, unicellular or multicellular, becoming larger. Another item to mention with growth pertains to multicellular organisms. As organisms grow, many change. This process of change is called <u>development</u>.</p>



Metabolism and Homeostasis (05:02)



Cells: The Basic Units of Life (01:49)

[Worksheet Activity#1](#)

Levels of Organization

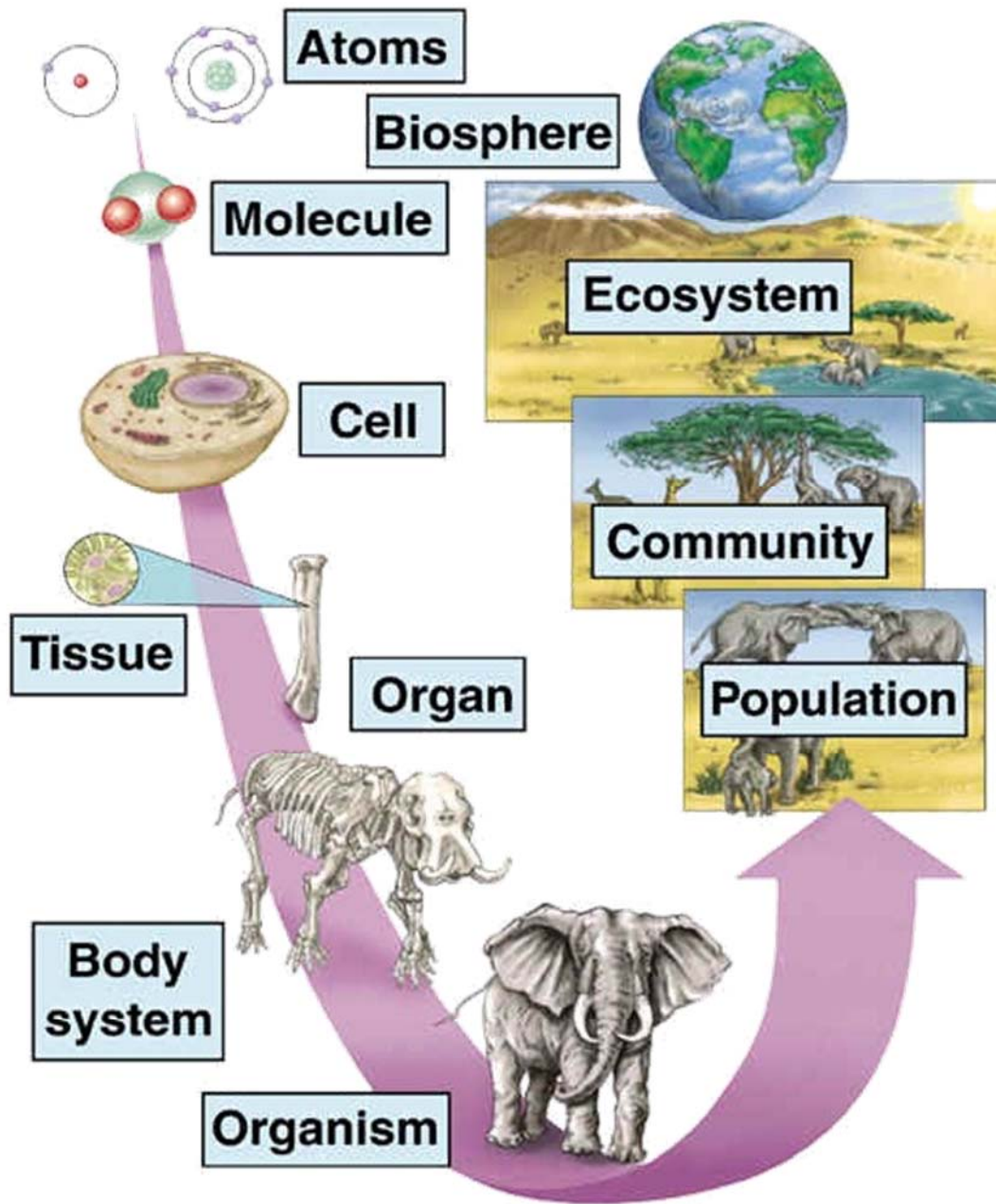
In unicellular (single-celled) organisms, the single cell performs all life functions. It functions independently. However, multicellular (many celled) organisms have various levels of organization within them. Individual cells perform specific functions and also work together for the good of the entire organism. The cells become dependent on one another.

Multicellular organisms have the following 5 levels of organization, ranging from simplest to most complex, that then continue beyond the independent organism as is shown below and will be further discussed in upcoming lessons.

Level 1	CELLS	<ul style="list-style-type: none"> • Cells are the basic unit of structure and function in all living things. • In a multicellular organism, each cell performs a specific function for the organism. • In a unicellular organism, the cell performs all of the functions for the organism. • <i>Multicellular examples: skeletal muscle cell, parenchyma cell (plant root cell)</i>
Level 2	TISSUE	<ul style="list-style-type: none"> • Tissues are made up of a group of cells that are similar in structure and function and which work together to perform a specific function. • <i>Examples: skeletal muscle tissue, ground tissue (in plant roots)</i>
Level 3	ORGAN	<ul style="list-style-type: none"> • An organ is made up of a collection of tissues that work together to carry out a specialized function. • <i>Examples: biceps brachii (muscle of your upper arm), root of a plant</i>
Level 4	ORGAN SYSTEM	<ul style="list-style-type: none"> • An organ system is made up of a group of organs that work together to perform a specific function for the organism. • <i>Examples: Skeletal Muscle System, Root System</i>
Level 5	ORGANISM	<ul style="list-style-type: none"> • In multicellular organisms, an organism is made up of all of the organ systems working together to carry out all of the life processes for the survival of the organism. (<i>Example: Human, Oak Tree</i>) • In unicellular organisms, this level is made up of only the one cell from level 1. (<i>Example: Bacteria, Protist</i>)

Level 6	POPULATION	<ul style="list-style-type: none"> • A population is a group of organisms of the same species (type) that live in a specific geographical area. • <i>Example: All of the Cardinals (species of bird) that live in Jefferson County, Ohio.</i>
Level 7	COMMUNITY	<ul style="list-style-type: none"> • A community is a group of various species or populations that live in the same habitat and interact with each other. • <i>Example: All of the Cardinals, Earthworms, and Oak Trees that live in Jefferson County, Ohio.</i>
Level 8	ECOSYSTEM	<ul style="list-style-type: none"> • An ecosystem is a community of organisms and their nonliving (abiotic) or physical environment. • <i>Examples: All of the Cardinals, Earthworms, Oak Trees, Streams, River, Sunlight, and Soil.</i>
Level 9	BIOSPHERE	<ul style="list-style-type: none"> • The biosphere is a region of Earth's crust, waters, and atmosphere inhabited by living things.

[Worksheet Activity#2](#)



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Quizlet



Now answer questions 1 through 25.