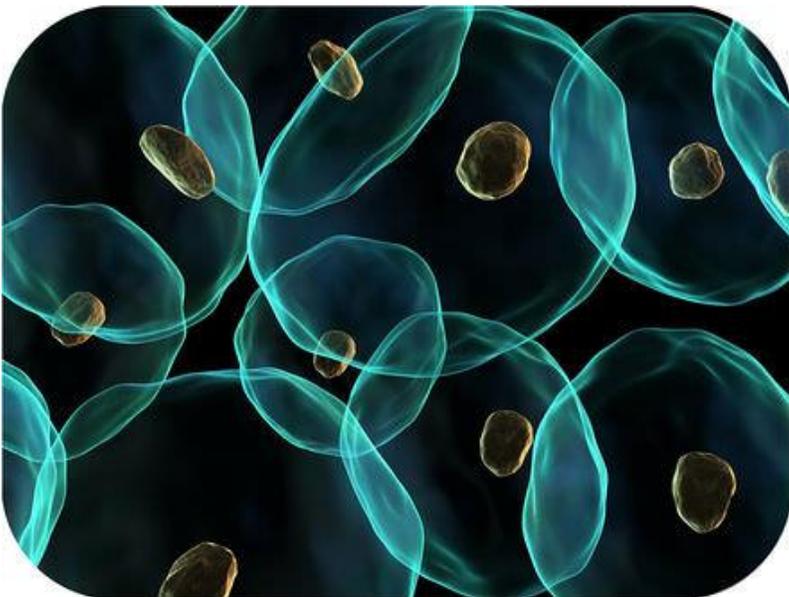


LIVING THINGS CONTAIN ONE OR MORE CELLS

Scientists know that all living things are organized. The smallest unit of organization of a living thing is the cell. A cell is a collection of living matter enclosed by a barrier known as the plasma membrane that separates it from its surroundings. Cells can perform all the functions we associate with life.

Cells are organized and contain specialized parts that perform particular functions. Cells are very different from each other. A single cell by itself can form an entire living organism. Organisms consisting of only a single cell are called unicellular. A bacterium or a protist like amoebas and paramecia are unicellular. However, most of the organisms you are familiar with, such as dogs and trees, are multicellular. Multicellular organisms contain hundreds, thousands, even trillions of cells or more. Multicellular organisms may have their cells organized into tissues, organs, and systems. Whether it is unicellular or multicellular, all structures and functions of an organism come together to form an orderly living system.

Functional cells are not found in nonliving matter. Structures that contain dead cells or pieces of cells are considered dead. For example, wood or cork cut from a tree is made up largely of cell walls. The cells are no longer functional.



REPRODUCTION

Perhaps the most obvious of all the characteristics of life is reproduction, the production of offspring. Organisms don't live forever. For life to continue, organisms must replace themselves. Reproduction is not essential for the survival of an individual organism. However, it is essential for the continuation of an organism's species. A species is a group of similar-looking organisms that can interbreed and produce fertile offspring. If individuals in a species never reproduced, it would mean an end to that species' existence on Earth.

There are two basic kinds of reproduction: **sexual** and **asexual**. Sexual reproduction requires that two cells (sperm and egg) unite to produce the first cell of the new organism. Organisms reproducing sexually do not always have "sex!" In many cases sperm and egg are released into the water where they meet. Most familiar organisms – from maple trees to birds and bees – reproduce sexually. In asexual reproduction, a single organism can reproduce without the aid of another. Sometimes these organisms can just divide themselves in two!



GROWTH AND DEVELOPMENT

Adults don't always look like the babies of a species. All organisms begin their lives as single cells. Over time, these organisms grow and take on the characteristics of their species. Growth results in an increase in the amount of living material and the formation of new structures.

All organisms grow, and different parts of organisms may grow at different rates. Organisms made up of only one cell may change little during their lives, but they do grow. On the other hand, organisms made up of numerous cells go through many changes during their lifetimes. Think about some of the structural changes your body has already undergone in your short life. All of the changes that take place during the life of an organism are known as its development.

A snowball grows when you roll it over fresh snow! Why isn't it a living thing? The growth of the snowball is not internal. It does not grow by producing more cells like organisms. It just adds on more material to the outside. Someone has to roll the snowball. It won't grow bigger by just sitting there and it certainly cannot change liquid water or solid ice into new snow from which it can grow larger. This is one of the differences between growth of a living thing and growth of a nonliving thing.



OBTAIN AND USE ENERGY

Energy is the ability to make things change. Energy is important because it powers life processes. It provides organisms with the ability to maintain balance, grow, reproduce, and carry out other life functions. Some organisms obtain energy from the foods they eat or, in the case of plants and several other types of organisms, the foods that they produce. Organisms that get energy from the food they eat are called heterotrophs. Organisms that use energy from the sun to make their own food (which they then use for energy) are called autotrophs. The process is called photosynthesis.

As you'll learn, energy doesn't just flow through individual organisms; it also flows through communities of organisms, or ecosystems, and determines how organisms interact with each other and the environment.



RESPOND TO THE ENVIRONMENT (MAINTAIN HOMEOSTASIS)

Living things live in a constant connection with the environment, which includes the air, water, weather, temperature, any organisms in the area, and many other factors. These external environmental factors act as stimuli and can cause a response from living things. Organisms need to respond to the changes in order to stay alive and healthy. For example, if you go outside on a bright summer day, the sun may cause you to squint. Perhaps the bark of an approaching dog causes you to turn your head quickly. Just as you are constantly sensing and responding to changes in your environment, so are all other organisms. For example, a specialized leaf of the Venus' flytrap senses the light footsteps of a soon-to-be-digested green bottle fly. The plant responded to this environmental stimulus by rapidly folding the leaf together.

An organism must respond to changes in the internal environment as well. Internal conditions include the level of water, nutrients, and minerals inside the body. It also refers to body temperature and hormone levels. Adjustments to internal changes help organisms maintain a stable internal environment. The regulation of an organism's internal environment to maintain conditions suitable for life is called homeostasis. Or you can just think of it as keeping everything in BALANCE! For example, you have a "thermostat" in your brain that reacts whenever your body temperature varies slightly from 37°C (about 98.6°F). If this internal thermostat detects a slight rise in your body temperature on a hot day, your brain signals your skin to produce sweat. Sweating helps cool your body.

The ability of mammals and birds to regulate body temperature is just one example of homeostasis. Mechanisms of homeostasis enable organisms to regulate their *internal* environment, despite changes in their *external* environment



