

Energy: Ecosystems and Organisms

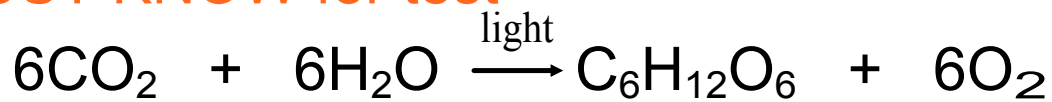
The flow of energy through an ecosystem is one of the most important factors that determines the system's capacity to sustain life.

~~X~~ Sunlight is the main energy source for life on Earth.

Photosynthesis

carbon dioxide + water $\xrightarrow{\text{light}}$ ^(glucose) carbohydrates + oxygen
(from air)
earth

MUST KNOW for test



NOT ON TEST

Chemosynthesis

When organisms use chemical energy to produce carbohydrates, the process is called chemosynthesis. The process is performed by several types of bacteria that live in volcanic vents, hot springs, and tidal marshes.



Chemosynthesis is a process certain organisms use to obtain energy for the production of food, akin to photosynthesis, but without the use of sunlight. The energy comes from the oxidization of inorganic chemicals that the organisms find in their environment. The process occurs in many bacteria, and in another group of organisms known as *archaea*. The life forms that use this method to obtain energy are found in a variety of environments, including soil, the intestines of mammals, petroleum deposits, and in extreme conditions, such as around hydrothermal vents on the ocean floor. They are adapted to circumstances which may have been commonplace billions of years ago, leading some scientists to theorize that they may be direct descendants of the earliest life on Earth.

Methods

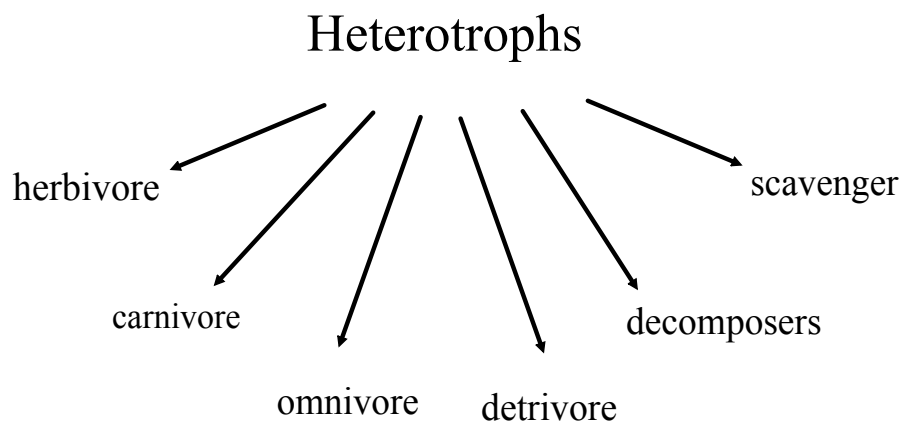
Organisms that make their own food out of inorganic chemicals, as opposed to using already existing organic materials, are known as autotrophs. The foods consist of carbohydrates, such as [glucose](#), but these require energy to manufacture. Where sunlight is available, autotrophs will generally use it to perform photosynthesis, but in places where no light reaches, different types have evolved that use chemical energy instead. The life forms that do this are known as chemautotrophs. A number of different methods have arisen, determined by the conditions, and the chemicals that are available.

Autototrophs vs. Heterotrophs

Autotrophs (producers) capture energy from sunlight or chemicals to produce their own food.

ie / plants

Organisms that rely on other organisms for their energy and food supply are called heterotrophs (consumers). These include animals, fungi and bacteria.



Herbivores, such as cows, obtain energy by eating only plants.

Carnivores, such as snakes and owls, eat only animals.

Omnivores, such as humans and bears, eat both plants and animals.

Detritivores, such as earthworms, feed on dead matter.

Decomposers, such as fungi, break down organic matter.

Scavengers, such as vultures, consume the carcasses of other animals.

Food Chains and Food Webs



When one organism eats another, the energy in an ecosystem moves along a one-way path.

energy moves through an ecosystem via a food web or chain

Energy Flows \longrightarrow

Ex) GRASS \longrightarrow Rabbit

The energy stored by producers can be passed through an ecosystem along a food chain, a series of steps in which organisms transfer energy by eating and being eaten.

Example - Prairie Ecosystem

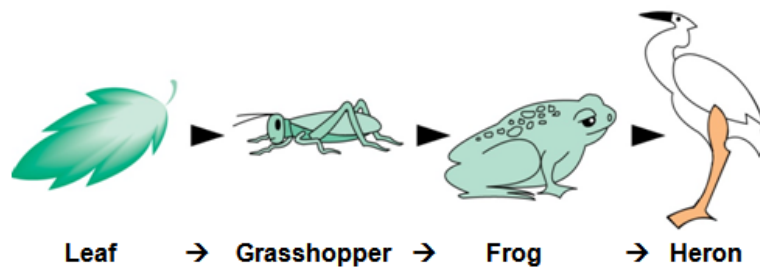
grass \longrightarrow grazing antelope \longrightarrow coyote

Example #2 - Marine Ecosystem

algae \longrightarrow zooplankton \longrightarrow herring \longrightarrow squid \longrightarrow shark

Food Chain

The arrows in a food chain show what eats what. The arrow replaces the phrase "is eaten by." The direction of the arrow is very important. The arrow must point toward the "eater."



In most ecosystems, feeding relationships are more complex than can be shown in a food chain.

When the feeding relationships among various organisms in an ecosystem form a network of complex interactions, ecologists describe these relationships as food webs.

✗ A food web links all the food chains in an ecosystem together.

Food Web

A food web shows the many possible food chains that exist in an ecosystem.

