

ECOLOGY

6.2 Energy and nutrient transfer

Objectives

- *Define autotrophs*
- *Define the terms consumers, heterotrophs including herbivores, carnivores , omnivores , parasites , detritivores , Saprotrophs*

Resources

Book pages

131,132,133

Modes of nutrition for an ecosystem to survive, the biotic and abiotic factors need energy and nutrients. **Energy in the form of sunlight is continuously available**, though the supply varies. For example, there is less sunlight available in winters than in summers because there are fewer hours of daylight. In contrast, the supply of inorganic nutrients in an ecosystem is finite, meaning that the supply is being constantly cycled through the ecosystem.

There are a number of ways in which the organisms in an ecosystem obtain the necessary energy and nutrients they need. **These methods are known as modes of nutrition. Living organisms can be divided into two main categories, autotrophs and heterotrophs, based on the way they obtain their food.**

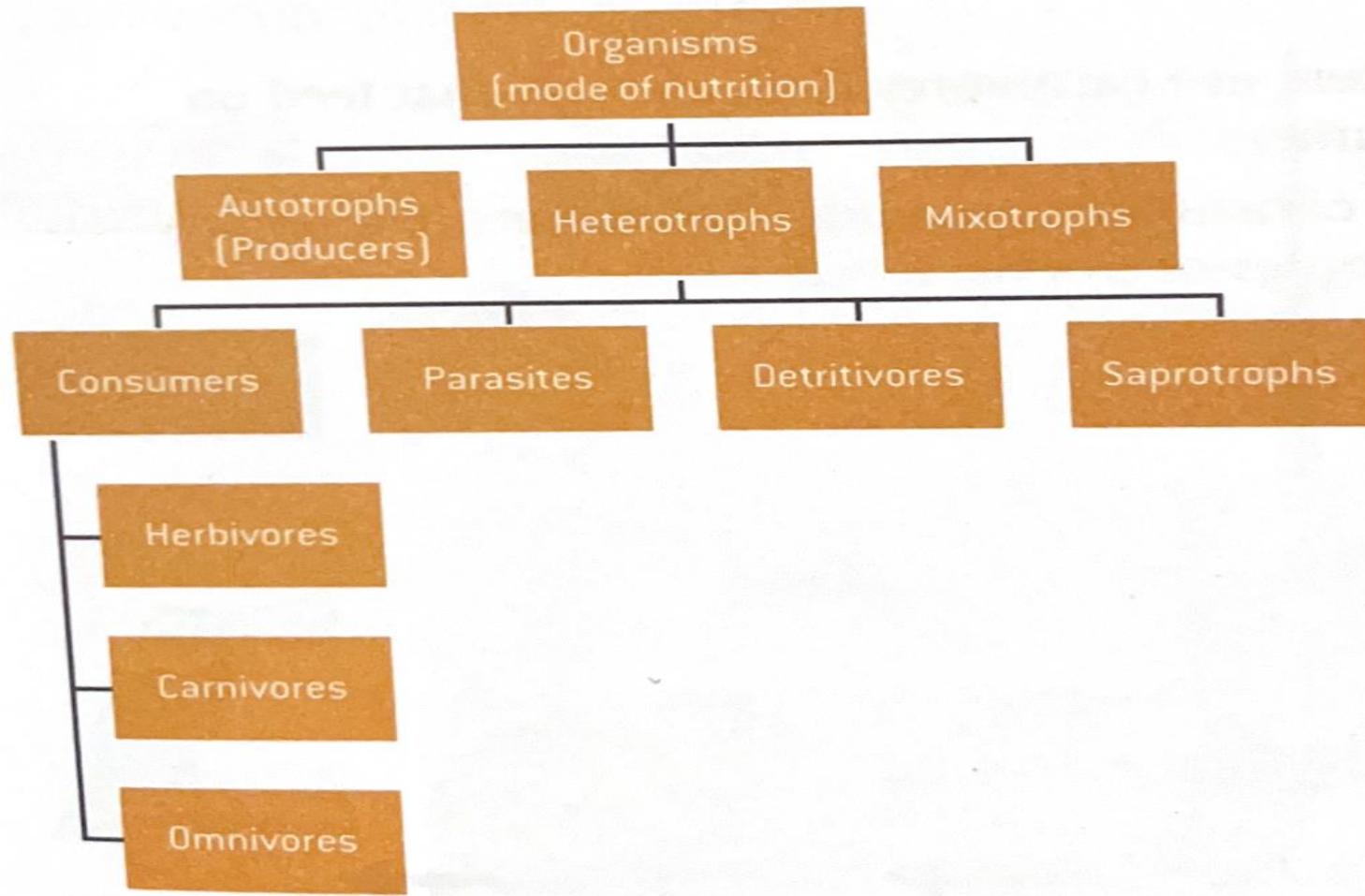


Figure 5. The modes of nutrition of organisms

Autotrophs

The term autotroph is derived from two Greek words: auto which means "self" and trophe which means "nutrition". Autotrophs are organisms that synthesize their organic molecules from simple inorganic nutrients. The inorganic nutrients used by autotrophs de from the abiotic environment. Most plants and algae are autotrophic , which means that they synthesize their own food through photosynthesis.

Autotrophic organisms are also known as producers.

Heterotrophs

The term heterotroph is derived from two Greek words: hetero which means "other" and trophe which means "nutrition". Heterotrophs are organisms that obtain organic nutrients from other organisms.

Depending on the method of food intake, heterotrophs may be consumers, parasites, detritivores and saprotrophs.

- **Consumers are heterotrophs that obtain their organic nutrients by ingesting living organisms such as plants or animals. Consumers could be herbivores, carnivores or omnivores.**
 - Herbivores, for example zebras, feed on producers (such as grass).
 - Carnivores, for example lions, feed on other consumers (such as zebras).
 - Omnivores, for example chimpanzees, feed on a combination of both producers and consumers.
- **Parasites are heterotrophs that live on or inside other living organisms (called hosts) and obtain their food from them. Tapeworms are an example of a parasite.**
- **Detritivores (for example, an earthworm) are heterotrophs that obtain organic nutrients from detritus (non-living organic matter) by internal digestion.**

- **Saprotrophs are heterotrophs that obtain organic nutrients from dead organisms by external digestion.** Saprotrophs are also known as decomposers because they have a role in breaking down organic material. **Bacteria and fungi are examples of saprotrophs.**

Note :Some organisms use a combination of different modes of nutrition and can act as both autotrophs and heterotrophs depending on the surrounding conditions. These organisms are known as mixotrophs.

For example, euglena is an algae that can act as both an autotroph and a heterotroph (figure 3). In sufficient light, it will act as an autotroph and can photosynthesize to make its own food. In low light, it will act as a heterotroph and ingest food particles by phagocytosis.

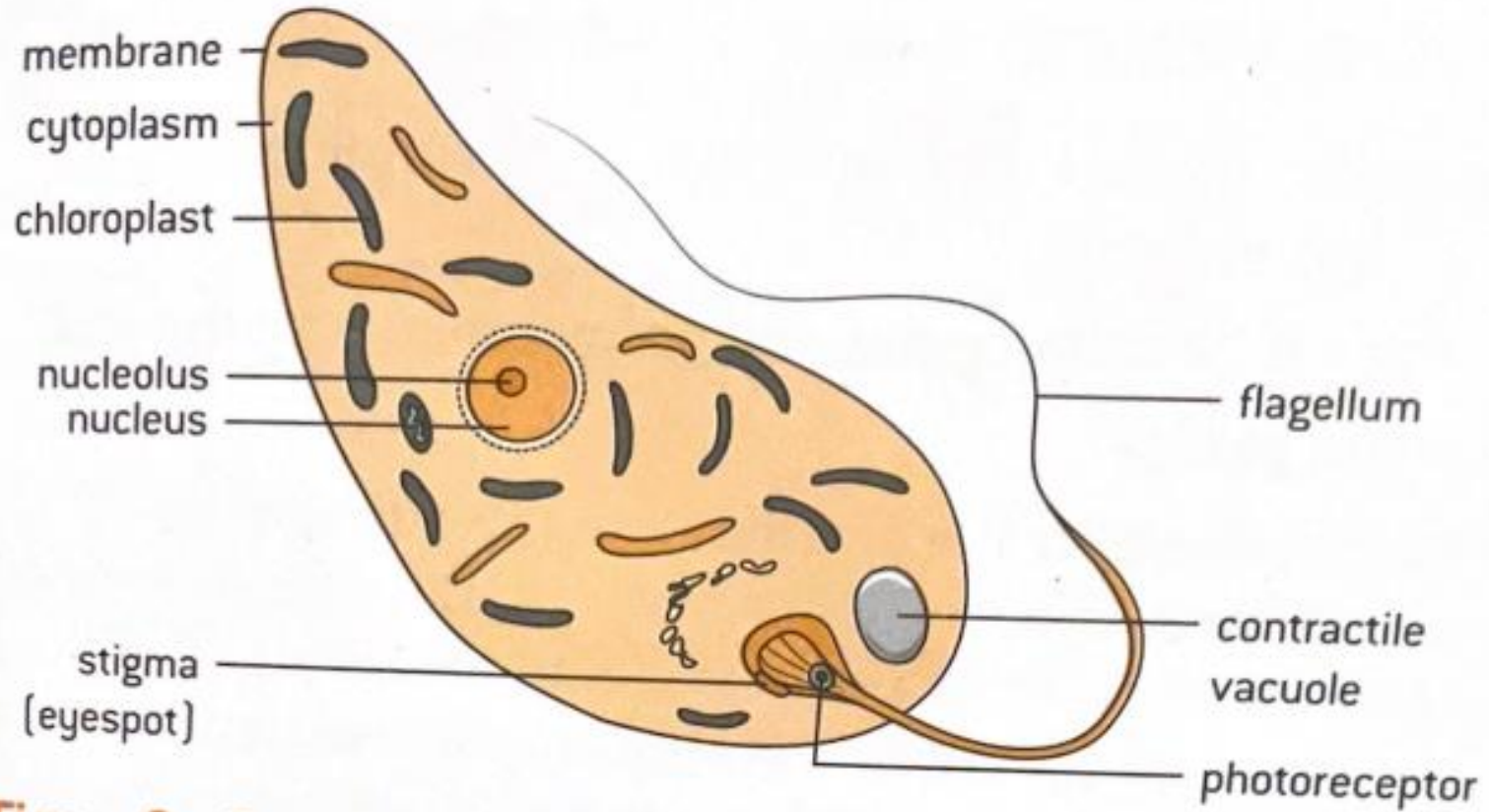


Figure 3. Euglena

Key term

Consumers are heterotrophs that obtain their food from other living organisms; they can be herbivores, carnivores or omnivores.

Parasites are heterotrophs that obtain their food from a host organism.

Detritivores are heterotrophs that obtain their food from detritus by internal digestion.

Saprotrophs are heterotrophs obtain their food from dead organisms by external digestion.

Detritus is the non-living organic matter such as animal remains, waste products and other organic matter that falls onto the soil from the surroundings.

Internal digestion occurs when the organism secretes digestive enzymes to break down food inside the body.

External digestion occurs when the organism secretes digestive enzymes to break down the food outside the body and then absorbs the products of digestion

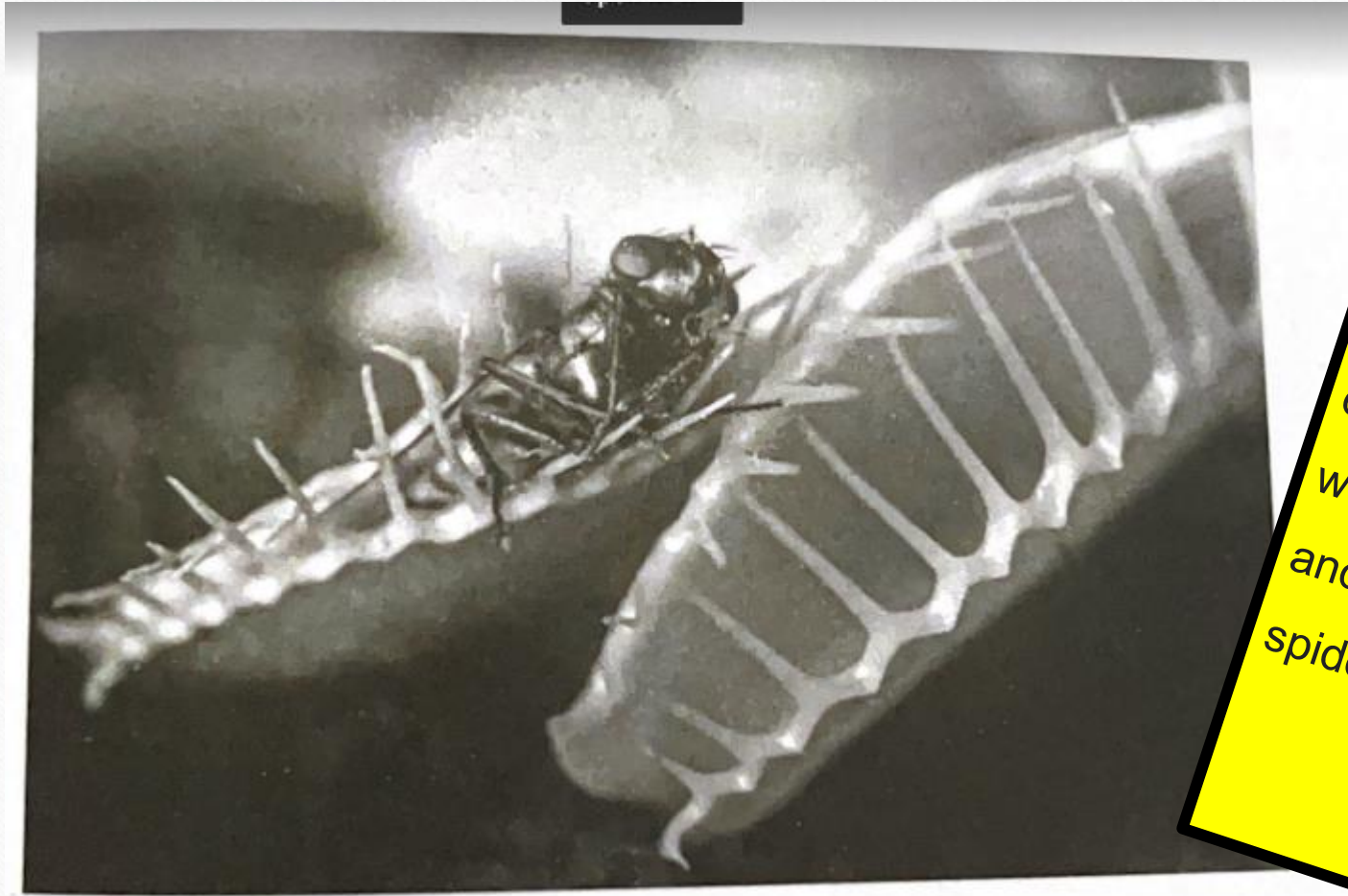


Figure 4 Venus fly trap

Another example is the Venus flytrap (figure 4), a plant that can act as an autotroph like most plants and can photosynthesize to make its own food. However, due to the nutrient poor soil of the wetlands where it lives, it traps and digests both insects and spiders just like an autotroph.