Structure and functioning of ecosystems

1. The biosphere and its components:

Biosphere literally means sphere of life, i.e. all life on earth. Living beings are

located in a narrow layer on the Earth's surface. This includes the lower atmosphere, the oceans, seas, lakes and rivers, known as the hydrosphere, and the thin surface layer of land known as the lithosphere.

The thickness of the biosphere varies considerably from one point to another, since life penetrates as far as the ocean trenches. ocean trenches beyond a depth of 10,000 m, whereas in the lithosphere there is hardly any trace of life beyond

than ten metres or so. In the atmosphere, as a result of the increasing scarcity of oxygen, living beings become rarer with altitude and rarely live more than a few metres above sea level and rarely live above 10,000 metres.

The major source of energy in the biosphere is the sun. The other major source is geothermal energy.

Through photosynthesis, plants convert solar energy into chemical energy, and animals eat these plants or each other these plants or by eating each other, recover this energy.

2.Organisation of the biosphere:

The most elementary level of organisation in living organisms is the cell. This is integrated into the individual, which is integrated into a population. The population is part of a community or biocenosis. The biocenosis is in turn part of the ecosystem. Together, the ecosystems form the biosphere, which is the highest level of living organism.

An ecosystem is made up of all living beings (biocenosis) and the environment in which they live (biotope).

The biotope provides energy and organic and inorganic matter of abiotic origin. The biocenosis comprises three categories of organisms: producers of organic matter, consumers of this matter and decomposers who decomposers who recycle it. Plants capture the sun's energy and produce carbohydrates, which are then transformed.

They will be grazed by herbivores, which will then be eaten by carnivores. The decomposers consume everyone's waste and corpses, allowing various substances to be returned to the environment.

substances back into the environment. in terms of its unity, organisation and functioning, the ecosystem is the basic link in the biosphere of the biosphere.

3. The trophic chain

3.1. Definitions

A trophic chain or food chain is a succession of organisms, each of which depends on the previous organism.

Every ecosystem comprises a set of animal and plant species that can be divided into three groups:

producers, consumers and decomposers

3.1.1. Producers

These are photosynthetic autotrophic plants (green plants, phytoplankton: cyanobacteria or blue algae : prokaryotic organisms). As primary producers, they constitute the first trophic level of the ecosystem.

Through photosynthesis, they produce organic matter from strictly mineral matter supplied by the external environment. abiotic environment.

3.1.2. Consumers:

These are living beings, known as heterotrophs, that feed on the complex organic matter they have already produced, which they from other living beings. They consider themselves to be secondary producers. Consumers occupy a different trophic level depending on their diet.

We distinguish between consumers of fresh matter and consumers of corpses.

a- Consumers of fresh matter are :

Primary consumers (C1): These are the phytophages that eat the producers. They are generally

animals, called herbivores (herbivorous mammals, insects, crustaceans: shrimp), but also, more rarely plant and animal parasites of green plants.

Secondary consumers (C2): Predators of C1. These are carnivores that feed on herbivores

(carnivorous mammals, birds of prey, insects, etc.).

Tertiary consumers (C3): Predators of C2. They are therefore carnivores that feed on

carnivores (insectivorous birds, birds of prey, insects, etc.).

In most cases, a consumer is omnivorous and therefore belongs to several trophic levels.

C2s and C3s are either predators that capture their prey, or animal parasites.

b- Consumers of animal corpses

Scavengers or necrophages are species that feed on fresh or decomposed animal corpses.

decomposed. They often finish the job of carnivores. Example: Jackal, Vulture,...

3.1.3. Decomposers or detritivores:

Decomposers are the various organisms and micro-organisms that attack corpses and excreta, gradually decompose them little by little, gradually returning the elements contained in the organic matter to the mineral world.

Saprophyte: Plant organism that feeds on decomposing organic matter.

Example: fungi.

Saprophage: Animal organism that feeds on decomposing organic matter.

Example: Bacteria.

Detritivore: Invertebrate that feeds on animal and/or plant detritus or debris.

Example: Protozoa, earthworms, nematodes, woodlice.

Coprophage: Animal that feeds on excrement.

Example: dung beetle

3.2. Different types of trophic chain:

There are three main types of linear trophic chain:

- **Predator chain**

In this chain, the number of individuals decreases from one trophic level to the next, but their size increases (Elton's rule laid down in 1921).

Example: (100) Producers + (3) Herbivores + (1) Carnivore.

- **Chain of parasites**

On the other hand, there is a progression from large organisms to smaller but increasingly numerous organisms (Elton's rule). (Elton's rule is not verified in this case).

Example: (50) Grass + (2) Herbivorous mammals + (80) Fleas + (150) Leptomonas.

- **Chain of detritivores**

Moves from dead organic matter to increasingly small (microscopic) and numerous organisms (Elton's rule does not apply). Elton's rule is not verified in this case).

Example: (1) Corpse + (80) Nematodes + (250) Bacteria.

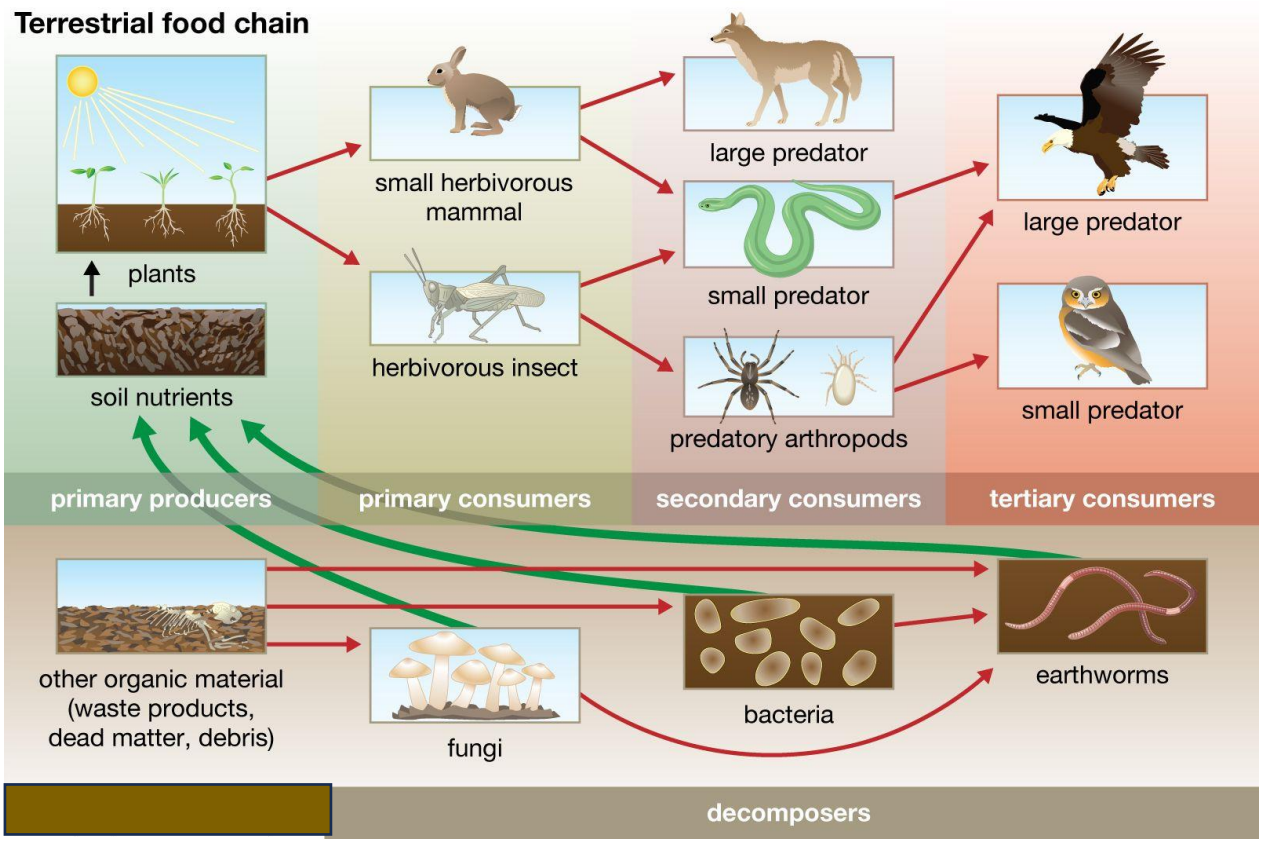

Figure 01: terrestrial food chain