

Chapter V: Ecosystem Functioning

The functioning of an ecosystem is the set of processes related to the flows of matter and energy in this ecosystem.

It consists of transforming the sun's light energy into chemical energy through the phenomenon of "photosynthesis" on the one hand, and on the other hand there are complex interdependent relationships between the elements of the ecosystem.

Chlorophyllous plants use the light energy of the sun to synthesize organic matter (lipids, carbohydrates, proteins). These organic materials will be used by the other elements of the ecosystem to constitute **a food web**: which is the set of trophic relationships between living beings of different trophic levels.

A- Trophic structure of an ecosystem:

Within a biocenosis, the function of organisms is not random. From a trophic point of view, we can distinguish several groups of organisms whose function is distinct.

1-Primary producers (autotrophs): chlorophyllous plants that use water, mineral elements and CO₂ to manufacture organic matter using solar energy.

2-Consumers (heterotrophs): these are all other living beings with the exception of autotrophic plants, are unable to manufacture organic matter. We can distinguish 03 levels of consumers:

2.1-First-rate consumers or primary consumers: these are the organisms that feed directly from the producers. These are plant pests, granivores, fruit pests, nectarivores, herbivores.

2.2-Secondary consumers or secondary consumers: these are the organisms that subsist by feeding themselves at the expense of primary consumers. So they are carnivores (predators)

2.3-Third-order consumers or tertiary consumers: these are carnivores that feed on other carnivores. These are organisms that are at the top of the food chains (represented by carnivores: sharks, panthers...or parasites or even necrophagous organisms).

Example: → grasshopper plant → snake → frog

Producers

CP

CS

CT

3-Decomposers: these are organisms that complete the trophic cycle. They break down organic matter and recirculate mineral elements that are contained in organic form in animal and plant debris, they act at all stages of the food chain.

Food chains do not always flow from a small to a large organism, the opposite is sometimes observed.

In an ecosystem, the phenomena of energy and material transfer are numerous, diversified and independent: in this case, we are talking about **food webs**.

B- The food chain:

A food chain is a succession of organisms, each of which lives at the expense of the previous one.

B.1/ Different types of food chains: There are three main types of food chains:

B.1.1/Predator food chain: this chain usually starts from the producers, following which, we observe a series of increasingly predatory organisms.

B.1.2/Parasite food chain: this type of chain is formed from large organisms to small organisms. In these chains, the appearance of hyper-parasites (parasite parasites) can be observed.

Pest chains have a significant impact on the functioning of ecosystems. They make it possible to achieve a balance in the ecosystem thanks to a role in regulating the numbers of parasitic populations.

Example:

Producer ----- herb N I

Herbivore -----Rapin ---- N II

Parasite 1 ----- chip----- N III

Parasite 2 -----leptomonas---N IV (flagellated protozoa)

B.1.3/Saprophyte trophic chain (detritivores): in this case, the trophic support consists of detritic material, i.e. decomposing organic matter. This type of chain involves many organisms (earthworms, bacteria, fungi) and plays a fundamental role in forest ecosystems. Indeed, when the foliage and twigs fall to the ground and join the litter, they are fragmented by the animals

saprophages (earthworms, mites, springtails), the fragments are dispersed in the soil and are taken up by fungi and bacteria that will complete the decomposition and release of mineral elements.

Example:

Dead wood → Insects → Mushrooms → Bacteria

Note: Dead organic matter is found at the beginning of each chain of decomposers.

These three types of chains coexist in the same ecosystem and are part of the food web of the ecosystem. Generally speaking, they have three or four trophic levels in the terrestrial environment, and five in the marine environment.

B.2/ Graphic representation of food chains

The diagramming of the structure of biocenoses is generally designed using ecological pyramids, which correspond to the superposition of horizontal rectangles of the same height, but of lengths proportional to the number of individuals, the biomass or the amount of energy present in each trophic level. We then speak of a pyramid of numbers, biomasses or energies.