ECOLOGY

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Objectifs

To have an overview of possible interactions in an ecosystem.

1. Introduction

1.1. What does “nature” mean ?

This is the first question I ask you in this class !!

Whats is "Nature" ?

A- a famous scientific journal.

B- the physical, geological, tectonic, meteorological, biological, evolutionary "forces" and principles that constitute the universe.

C- the biophysical environment, the habitat and the so-called natural environments.

D- the essence, the innate character, the set of fundamental properties of a thing or a being.

E- a synonym of universe or cosmos.

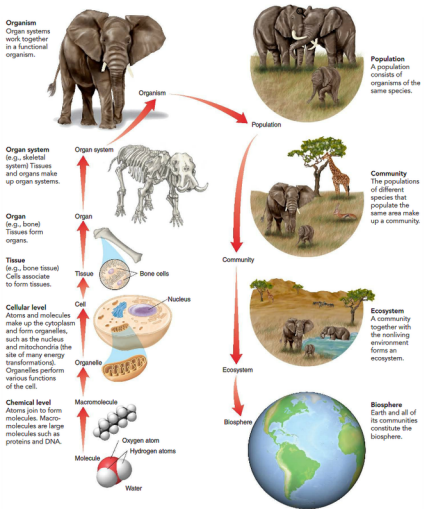
What do you think is a true answer ?

[cf. EV14-Ecology-v1.mp4]
[cf. EV14-Ecology-v1.mp3]

1.2. What is ecology ?

The term "ecology" was created by Heackel in 1866 to designate the science of habitat (from the Greek oikos = house, dwelling); it was a question of studying living beings no longer in breeding or laboratory but in their natural habitat. Nowadays, the definition tends to be more "systemic": it is said today that ecology is the study of the interactions between living organisms and the environment in which they live, and of living organisms among themselves, under natural or modified conditions.

Ecology is interested in the biosphere, and the biosphere is all the living beings on the planet, and all the environments they inhabit. The term ecosystem is used to characterize a sustainable interaction between organisms and an environment.



Ecology is also interested in biodiversity, which refers to the variety of life forms on Earth. This term is composed of the prefix bio (from the Greek βίος "life") and the word "diversity". It is assessed by considering the diversity of ecosystems, species and genes in space and time, as well as the interactions within and between these levels of organization.

Ecology can only be understood through evolution. It is based on observations on very varied time scales.

2. Ecosystem, it's structure and functions

[cf. EV14-Ecology-v2.mp4]

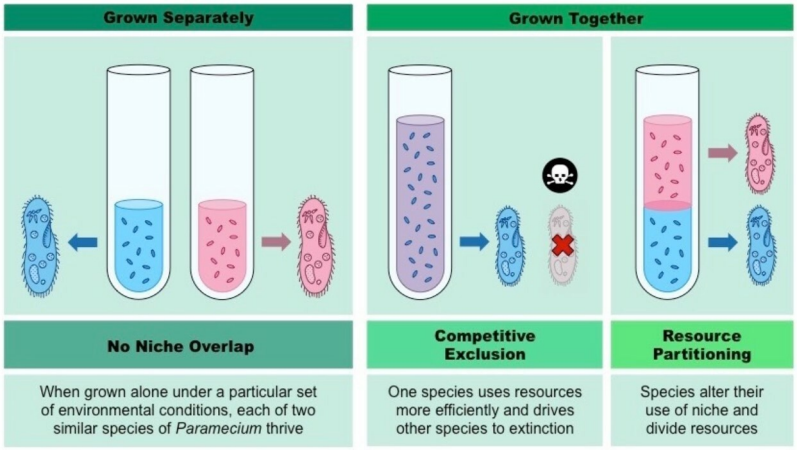
<!> The notion of an ecosystem is theoretical : it is multiscale, meaning that it can be applied to varying-sized portions of the biosphere, such as a pond, a meadow, or a dead tree. A smaller unit is called a microecosystem. An example of a microecosystem would be the species that have colonized a submerged rock. A mesoecosystem might be a forest, and a macroecosystem might be a region and its watershed.

Ecosystems, organized entities resulting from the action of ecological factors: the structure of 3. ecosystems

[cf. EV14-Ecology-v3.mp4]
[cf. EV14-Ecology-v4.mp4]
[cf. EV14-Ecology-v5.mp4]
[cf. EV14-Ecology-v6.mp4]

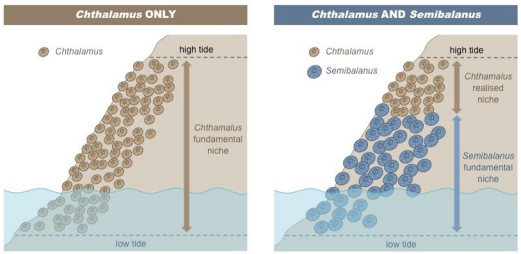
More about ecological niche :

In this picture you have an example of niche differention with bacteria.



Source of the image : bioninja.com

<!> Some species may not be able to occupy their entire niche due to the presence or absence of other species.



Ecologist Joseph Connell studied two species of barnacles - Balanus balanoides and Chthamalus stellatus - that have a stratified distribution on rocks on the Scottish coast.

In nature, Blanus species does not survive on the top of rocks because Balanus does not resist to desiccation (drying) incurred at low tide. Its niche is similar to its fundamental niche. However, Chthamalus species is usually concentrated on the upper rock strata. To determine the fundamental niche of the species, Connell he took back Balanus species from lower rock strata.

When Connel took back Balanus population from lower rock strata, Chthamalus population spread in this area.

The fact that Chthalamus had invaded this area, free from Blanus population indicates that the real niche of Chthamalus species is smaller compare its fundamental niche because of competitive exclusion.

4. Interactions between the populations of the biocenosis: the interspecific relations

[cf. Ecology _ ecosystems and interactions - Video 5.mp4]

Here you have an other video talking about Ecological relatioships : https://www.youtube.com/watch?v=rNjPI84sApQ

And here the video with parasitim examples : https://www.youtube.com/watch?v=NFa8-Hagg9Y

A symbiosis example

Symbioses of the mutualism type can be really important at the scale of ecosystems because they allow a rapid colonization of living environments.

Here is a example: symbiosis of coral algae.

https://youtu.be/JENUAv0w8Q4?t=7

Besides this ecological role, these symbioses are also very important for human health.

This is why we are going to have an overview of the human microbiota. The human microbiota is the set of bacteria, fungi and other microorganisms that live on the surface of the human being or inside.

Video : The Invisible Universe Of The Human Microbiome

https://youtu.be/5DTrENdWvvM?t=3

I also link you to a very interesting scientific conference on the subject (in french) : https://www.youtube.com/watch?v=1-6Z0JYsCQs&feature=emb_logo

To conclude

The species interactions discussed above are only some of the known interactions that occur in nature and can be difficult to identify because they can directly or indirectly influence other intra-specific and inter-specific interactions.

The role of abiotic factors adds complexity to species interactions and how we understand them.

That is to say, species interactions are part of the framework that forms the complexity of ecological communities. Species interactions are extremely important in shaping community dynamics. It was originally thought that competition was the driving force of community structure, but it is now understood that all of the interactions saw in the lesson, along with their indirect effects and the variation of responses within and between species, define communities and ecosystems.

5. Bibliography

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