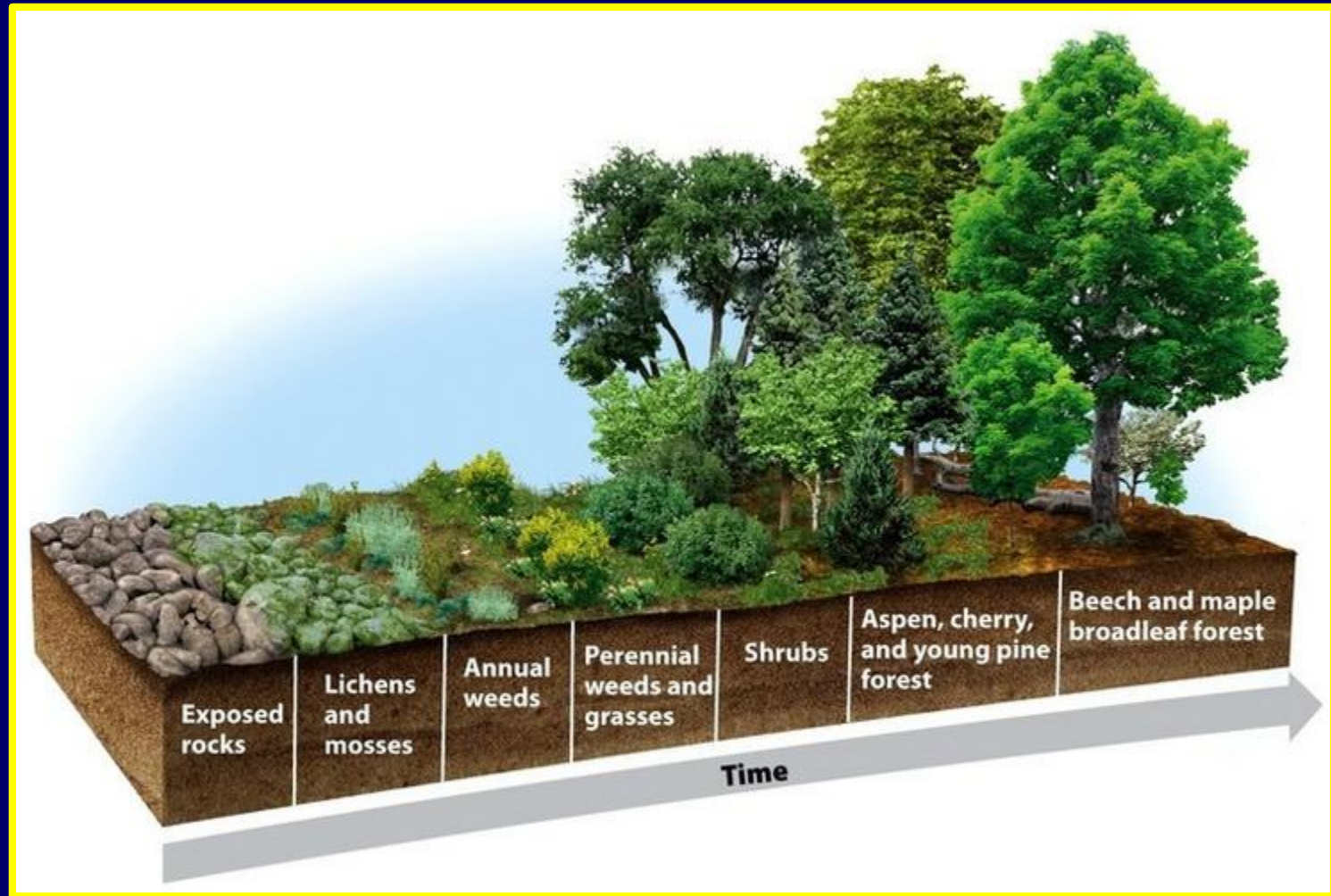


# Ecological Succession



# Essential Standard 2.7

Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere.

## Learning Objective 2.7.1

Explain how abiotic and biotic factors interact to create the various biomes in North Carolina.

# I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can distinguish between primary and secondary succession.
- I can describe various species that are found during different stages of succession.

# Ecological Succession

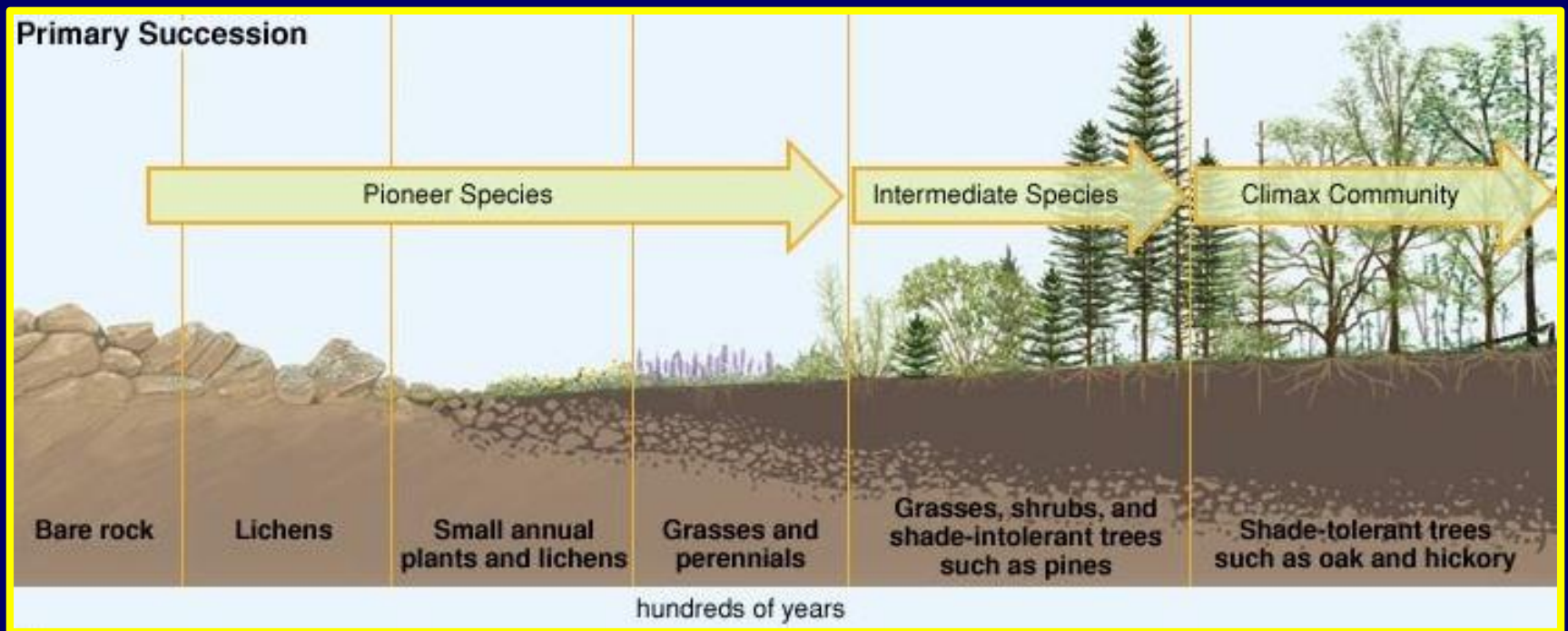
Over time, ecosystems can change in a process called ecological succession.



There are two types of ecological succession, primary succession and secondary succession.

# Primary Succession

Primary succession is when an ecosystem begins from bare rock and there is no soil present for plants to be able to take root.



# Primary Succession

One place where primary succession usually occurs is on volcanic islands.



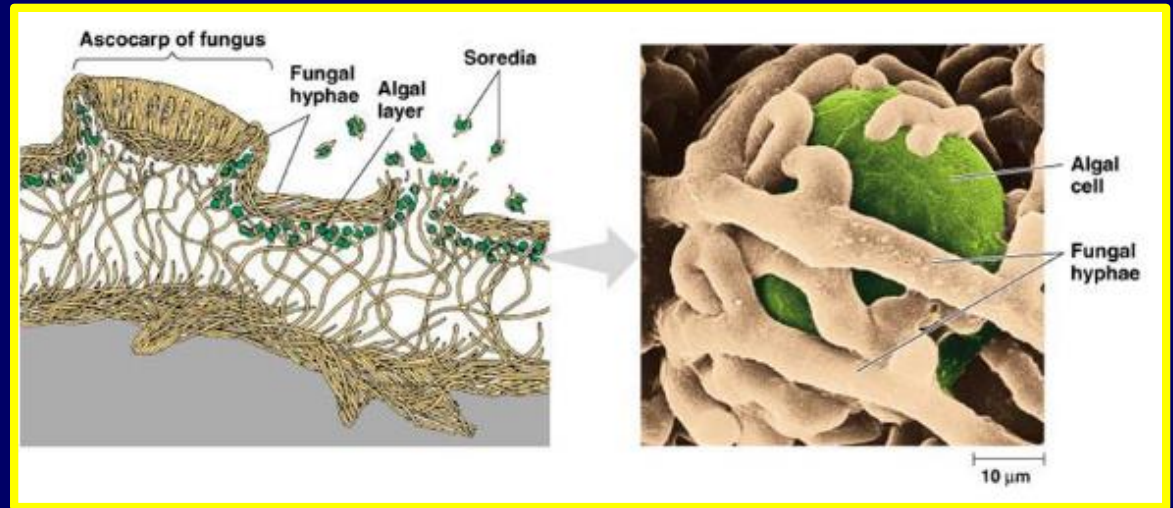
Originally, there is just rock and no soil.

The first species to begin living on the bare rock are called pioneer species.



# Pioneer Species

The most common pioneer species in all types of ecosystems isn't actually a species, but a combination of two species: an algae and a fungi.



The fungi attaches to the rock and secretes chemicals that break down the rock to provide minerals to the fungi and algae.

# Lichen

The fungi also collects, absorbs, and holds onto water, like a sponge, so the algae always has water.



The algae is able to photosynthesize to provide food to itself and the fungi.

Because both species benefit from this relationship, it's called a mutualistic relationship.



# Moss

Over time, the lichen break down enough rock to create a thin soil.



In damp, shaded areas, mosses, that don't have roots and don't need a lot of soil, begin to grow.

Over time, dust from the wind builds up on the moss, to create deep enough soil for small, rooted plants and grasses to grow.



# Light Tolerant Shrubs

Over time, the roots from the small plants begin to break down the rock even further to create enough soil for small, light tolerant, grasses and shrubs.



The light tolerant grasses and small shrubs are called intermediate species.

# Light Tolerant Trees

Over time, the roots from the shrubs begin to break down the rock even further to create enough soil for light tolerant, trees to begin to grow.



The light tolerant would also be called intermediate species.

# Shade Tolerant Trees

Hardwood trees, like oak trees, cannot tolerate a lot of sunlight as saplings. So, they begin to grow in the shade, under the light tolerant trees.

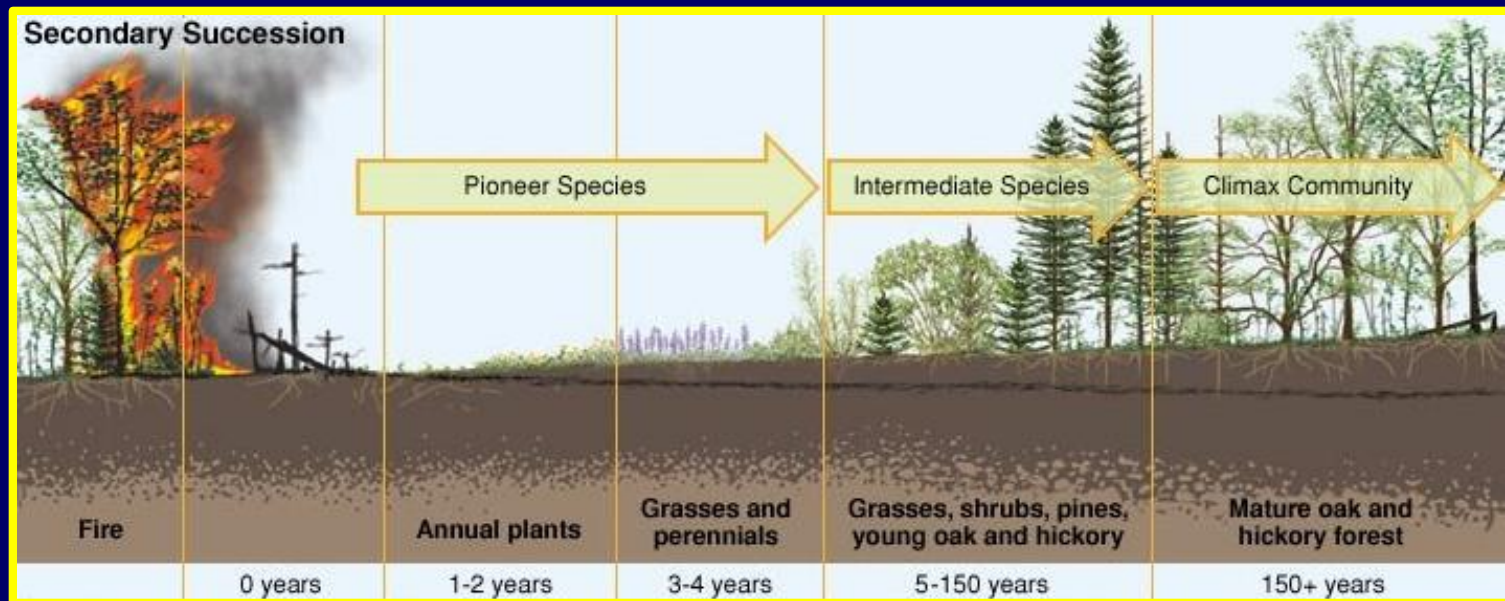


Overtime, the hardwoods grow tall enough to shade out the light tolerant trees and take over as the dominant plant species and primary succession is complete.

This is called the climax community.

# Secondary Succession

Secondary succession occurs when an ecosystem has gone through a major disturbance such as a fire or when farmland is allowed to return back to nature.



In this case, soil is already present, so the pioneer species stage is a lot shorter.

# Secondary Succession

During the second part of the 20<sup>th</sup> century, a lot of farmers in North Carolina stopped farming and allowed the land to go back to nature.

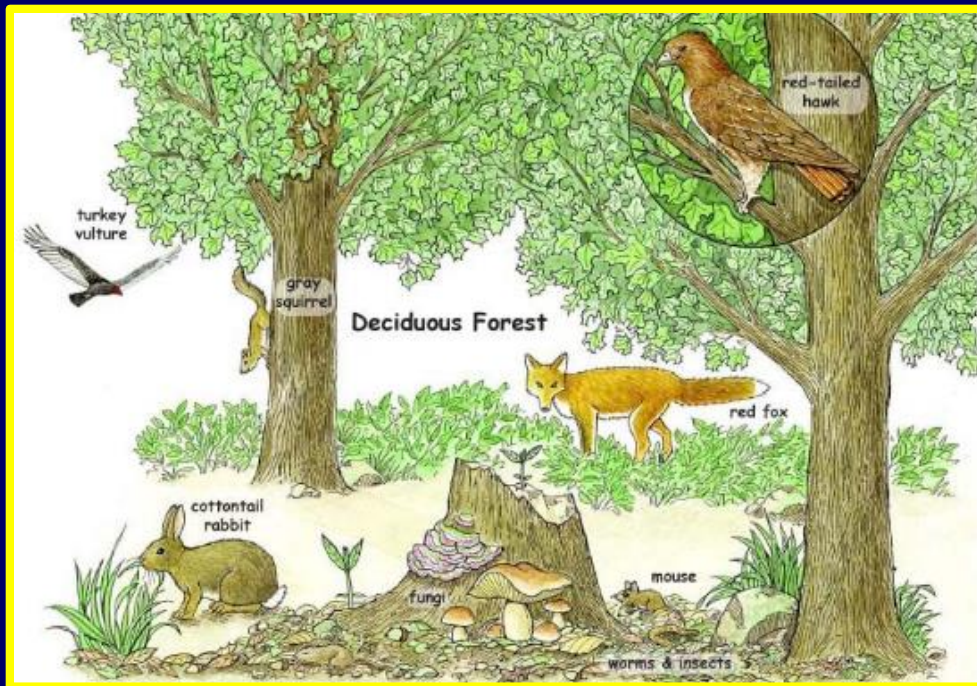


This is why you often see a lot of pine trees, in North Carolina, with younger hardwoods growing up near them.

It takes about 75 years for a pine forest to transition over into a hardwood forest.

# Abiotic Factors

Whether through primary or secondary succession, the abiotic factors, such as rainfall and temperature, determine what type of dominant plants will be found in the climax community.



The abiotic factors, such as precipitation and temperature, also determine the type of animals that can survive in that climax community.

# Precipitation

In places where there is very little precipitation, like in a desert, there won't be a lot succession.



The climax community in a desert will be light tolerant plants that are well adapted for dry conditions.



# Temperature

In places where the temperature is very low and the groundwater tends to stay frozen as permafrost, there also won't be a lot of succession.



The climax community in the arctic circle, tends to be lichen or cold tolerant plants with very shallow roots.

# Chaparral

Some climax communities, like the chaparral ecosystems in California, require periodic fires to clear out undergrowth in order to remain healthy.



An important management technique in chaparral ecosystems is to do controlled burns.

# The End

