Selection

Succession

- Before we start looking at natural selection in terms of genetic processes and heredity, it is important that you understand the influence of the interactions between plants, animals, and the environment on the ‘fitness’ of the animals that live there.
- As the plants change, so do the other organisms that live there.

Succession

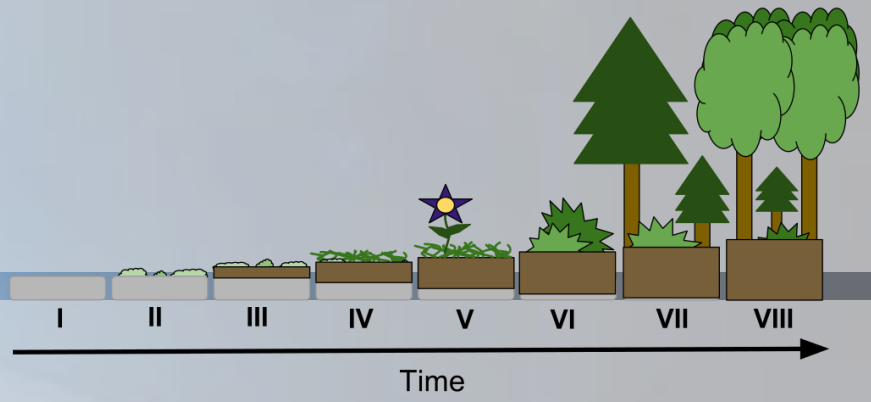
- is the gradual change of the species that make up a community over time.
- All ‘land’ on Earth had a beginning. T
- his beginning started with molten magma coming to the surface and solidifying into solid rock.
- This process of land formation is still happening on our planet. In fact, starting on May 3rd of 2018, lava has been creating new land on the big island of Hawaii.


COURTESY: PARADISE HELICOPTERS
ABC NEWS

Succession

- When the magma cools and solidifies, the result will be solid rock.
- The heat of the magma destroys all life in its path, and the existing soil is covered. Hawaii is a volcanic island, but somehow that bare, barren rock becomes the foundation for lush plant life. How does this happen?
- When you start with bare rock, primary succession is the process that takes place. The following interactive goes through the steps of primary succession.

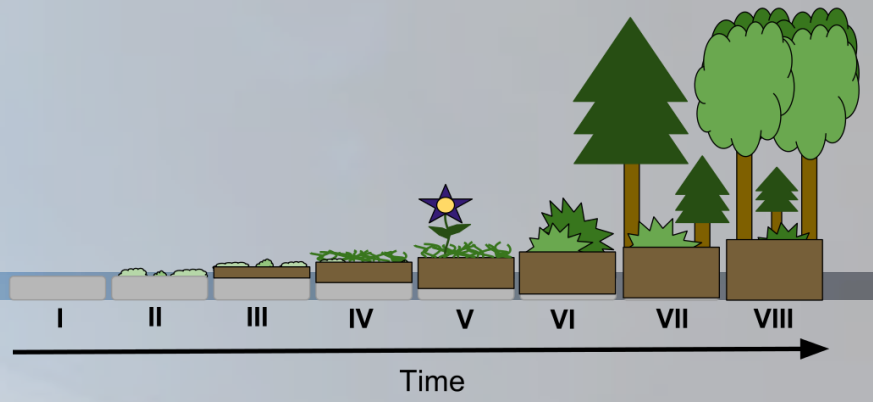
1º Succession



- I) Bare rocks from volcanic eruptions or exposed by declining glaciers.

- II) Lichens, a symbiotic combination of fungus with algae or cyanobacteria, and moss, a nonvascular bryophyte, begin to grow on the bare rocks. These organisms are known as pioneer species.

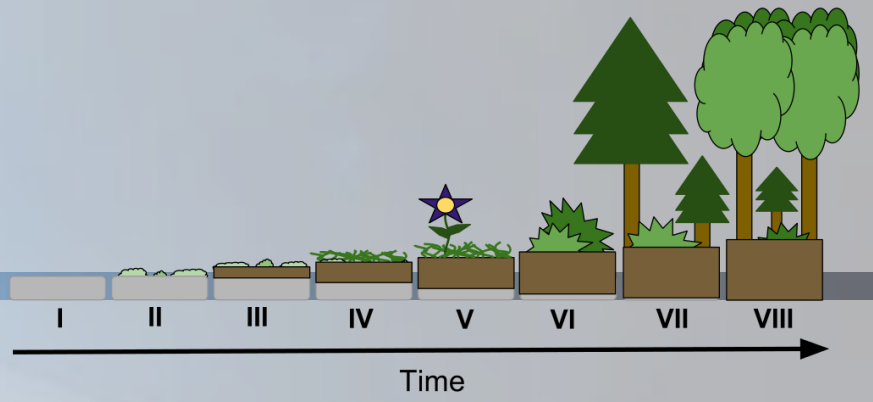
1º Succession



- III) As the moss and lichen die, they will decompose and organic material begins to build up. This organic material is the first soil.

- IV) The organic soil supports seeds of grasses and other vascular plants blown in on the wind or deposited in the droppings of passing birds. As each generation of plant dies and decomposes, the organic soil layer continues to build and thicken.

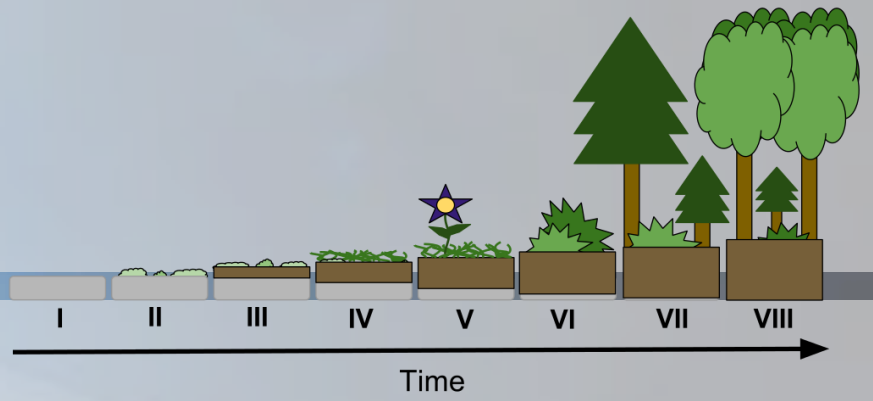
1º Succession



- V) Additional plant varieties start to establish themselves on the rich soil, and the soil layer continues to thicken, allowing roots of larger plants to take hold. The root systems prevent erosion of the soil.

- VI) The thicker soil also holds more water, and shrubs and bushes start to establish themselves.

1º Succession



- VII) Once the soil is deep enough, small trees, typically gymnosperms, can take hold.

- VIII) Larger gymnosperm and angiosperms begin to move in, and shade tolerant plants will establish themselves. At some point, the development of vegetation steadies. When this occurs, it is called the climax community.

1º Succession

- The succession from bare rock to climax community can take hundreds of years.
- As the plant life changes, so does the microclimate in that area.
- Plants will help moderate temperature, wind and moisture levels.
- The changes in the region mean that a plant that once thrived may not be the most fit for the current conditions.
- As this happens, new plants take over.


1992

Succession

- As the vegetation and the climate changes, different animal species will be attracted to the area.
- Insects will start to find shelter and food in the beginning stages of succession, and then larger animals such as mice and birds will start to move in.
- As the shrubs and bushes establish themselves, there will be more shelter for larger animals.
- The diversity of life continues to increase as the area heads toward its climax community.

Succession

- The change in biodiversity in the plant communities will drive change in the animal communities, as well.
- As the habitat changes, so do the resources in that area.
- An animal that was best suited for a grassland may not be the best fit for a habitat dominated by forest trees.
- As resources change, so too do the animal species who will dwell in that area.

2º Succession

- Secondary succession is similar to primary succession, only this occurs after an established area has been disturbed by an event such as fire, flood, or human activity.
- The major difference between the two types of succession is the starting point.

2º Succession

- Unlike primary succession that starts with bare rocks, secondary succession starts with the soil and organic material that is left after the disturbance.
- This means plants can root soon after the disturbance as compared to waiting until soil is produced from bare rock.

2º Succession

- If there is no human intervention in the secondary succession, it is possible that the climax community that forms may not be the same as the one that was established before the disturbance.
- Competition between plants and animals that move in during the succession process can have a large impact on the climax community that forms.

Secondary Succession

"soil remains"

Evolution of a Species

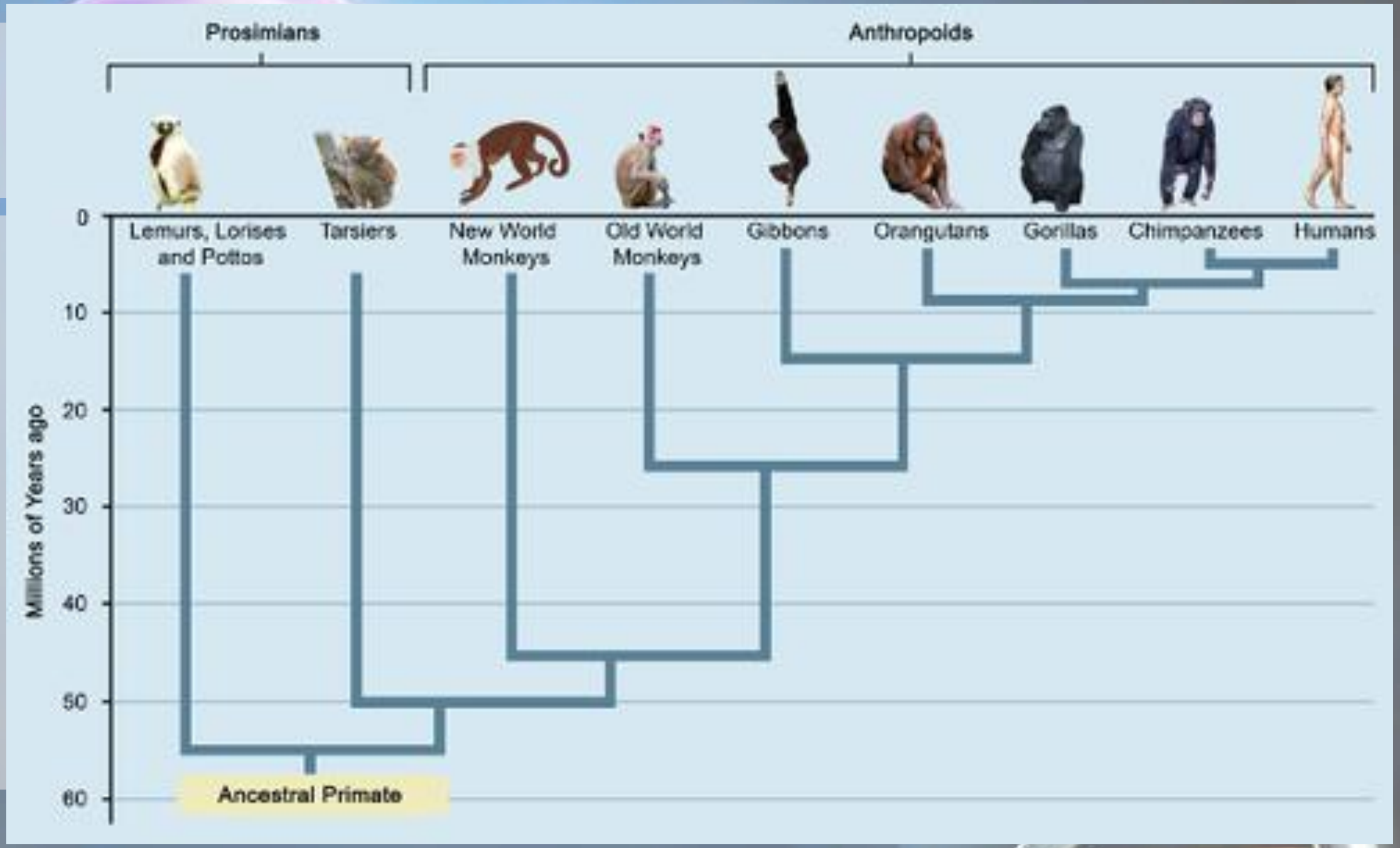
- Not only are we finding more new species all the time (and unfortunately, losing them, as well), the species that we do know are changing.
- These changes don’t happen overnight, and they aren't changes in a specific individual species. Instead, these changes happen to a population over generations.
- Simply put, species change, or evolve, over time.
- **It is important to understand that evolution takes time, and involves a number of factors.**

Evolution of a Species

- Evolution is not only about the mechanics of transferring DNA and its associated characteristics to offspring. There is much more to it.
- Before we look more deeply into evolution, it is important to remember that it is the theory of evolution that we will be exploring.
- This means that a number of plausible and scientifically accepted ideas have been used to explain evolution.

Evolution of a Species

- There are many misconceptions about evolution, many of which are caused by images like this:
- People did not evolve directly from apes.
- Instead, there is evidence that humans share a common ancestor with modern apes that existed five to eight million years ago. It is believed that two separate lineages diverged from that common ancestor, with one evolving into apes, and the other into humans.


Prosimians
Anthropoids
Lemurs, Lorises and Pottos
Tarsiers
New World Monkeys
Old World Monkeys
Gibbons
Orangutans
Gorillas
Chimpanzees
Humans
0
10
20
30
40
50
60
Millions of Years ago
Ancestral Primate


TEDEd
MYTHS and MISCONCEPTIONS about EVOLUTION

Mechanisms of Evolution

Mutations

- You looked at traits being passed from one generation to the next. Through your study of meiosis, you understand how crossing over and independent assortment result in variation between the gametes produced.
- But wait…why are there different alleles for the same characteristic in the first place? Why is it that one person can roll her/his tongue while another can't? If all humans are the same species, shouldn't we all have the exact same genes and express the exact same traits?

Mutation

- Although the process of DNA replication and cell division is amazingly robust and involves its own system of proofreading, some errors can still occur.
- It is these errors, or mutations, that produce the different alleles for a characteristic.
- Some mutations only affect the individual, while others can be passed onto the next generation through the inheritance patterns you just explored in the last activity.
- It is these heritable mutations that have an impact on a species as a whole.

Mutation

- The word mutation is often associated with harmful defects, but that is not always the case at all. When talking about evolution, you need to determine what the impact that the mutation has on the chances of that individual passing on its genetic material to the next generation.
- After all, that is what success is all about.

Mutation

- A majority of mutations that occur don’t have any impact on an organism's ability to pass on DNA to its offspring; that is to say that the change does not create an advantage of disadvantage in terms reproductive success.
- This type of mutation is referred to as a neutral mutation.

Mutation

- There are also harmful and beneficial mutations.
- Again, the harm or benefit is based on the impact it has on reproductive success. If it is a deleterious, or harmful, mutation, then the organism's ability to pass on genetic material is decreased.
- If the mutation is a beneficial mutation, the ability to pass on the traits to the next generation is increased.

Mutation

- Remember, harmful mutations decrease the chance of passing on genetic material.
- If that individual does not produce offspring, then the mutation will not be passed onto the next generation.

Mutation

- On the other hand, beneficial mutations increase the chances of reproductive success, in that the mutation makes the individual more fit for the current environment in which it lives.
- This means that these mutations, if heritable, will be passed on and can shape the population in the future generations.