Unit 4:
Biological Diversity

~Science 9 ~

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TOPIC 1: BIOLOGICAL DIVERSITY AND SURVIVAL

I Can…

- Describe the importance of variation in living things & why such variation occurs
- Provide examples of variations among and between species
- Identify the role of variation in strengthening

In all organisms, visible differences may be observed…

These differences are known as *variations*

Variations occur between species:

- There are over 8.7 MILLION different species on Earth that we know of today, the majority of which are plants, insects, and microorganisms

- Nearly 10,000 new species are discovered each year!

However, variations occur *within* each species as well:

*A species is any group of organisms that:

- Look similar
- Can mate with each other and produce fertile offspring

Biological diversity simply refers to the variation of life on Earth

- It is measured as the variation between species (*interspecific* variation), within species (*intraspecific* variation), and between ecosystems as well.

But why does such variation occur???

(Hint: What benefit might species gain from variation?)

Variations in physical and behavioural characteristics may allow organisms to better survive in their particular environment…

Example: Skin colour

Humans need sunlight to survive, as it permits the absorption of vitamin D. However, without any protection from the sun, harsh UV rays can damage cells.

Homo sapiens originate in Africa, where individuals with the genetic mutation encoding dark skin are more likely to survive & reproduce

Thus, populations that originated near the equator (where the sun is harsh) have dark skin

They eventually migrate North, where sunlight is more scarce. In this environment, individuals with the mutation encoding light skin are more likely to survive & reproduce

Thus, populations that originated in cooler regions (where sunlight is limited) have light skin

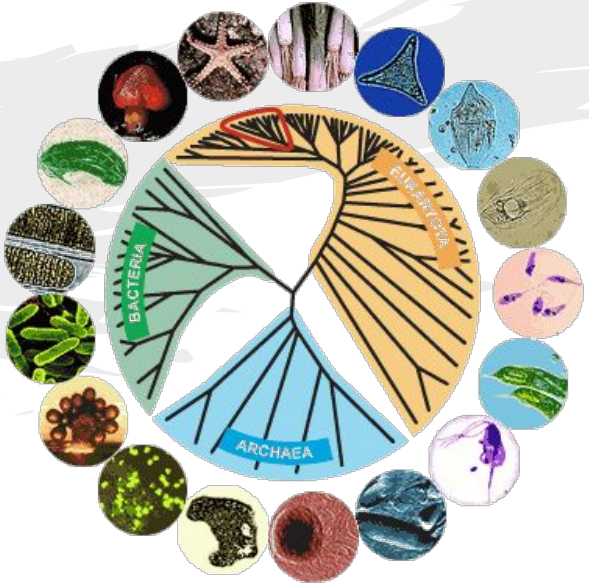
Variations that help an organism survive are known as *adaptations…*

- Adaptations may be structural (e.g. special receptors in owls eyes that allow them to see in the dark) or behavioral (e.g. unique calls orca's use to communicate with their pod)

* Note that not all traits are adaptations; although most characteristics of an organism have evolved to serve a purpose, some traits are simply the "by-product" of another characteristic (e.g. The chemical composition of blood causes it to reflect red light. While blood chemistry

If the variation helps that organism survive to reproduce, it will be passed on to offspring via their DNA. This is referred to as *natural selection*. Eventually, such traits become more common in one particular population, potentially leading to *speciation*- the formation of two distinct species that cannot interbreed)

Collectively, this process is referred to as *evolution.*



Evolution via natural selection is the mechanism responsible for Earth's incredible biodiversity.

The Value of Variation

Biodiversity is not only beneficial on a species level, but on an ecosystem level as well. This is because areas with greater biodiversity are more able to tolerate change…

Example:

Mountain pine beetles are especially fond of one particular species of tree, the lodgepole pine. Forests with diverse vegetation are able to withstand an infestation, while forests

“The Terrifying Truth About Bananas”

Variation is important!

Measuring Diversity

In order to determine the biological diversity and relative health of an ecosystem, biologists use a measurement called the *diversity index*.

- This is simply a comparison of the diversity of species in a given area with the total number of organisms in that same area
- A high diversity index is generally indicative of a healthy ecosystem

Which of the following ecosystems do you think has a higher diversity index? Which one is more likely to survive some sort of change in environmental conditions?