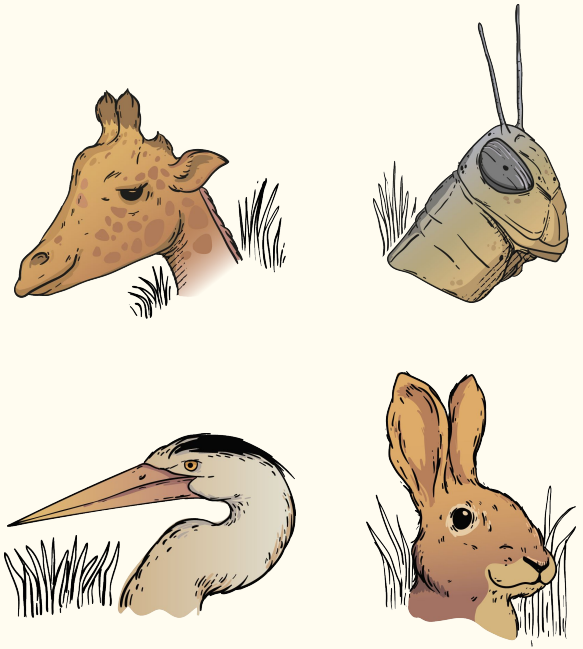
3rd Quarter | Unit 3.1

Theories of Evolution



Session Objectives

At the end of the session, learners will be able to:

- define evolution;
- compare and contrast Lamarck and Darwin's findings about the evolution of species; and
- discuss the mechanism of natural selection.

Assignment

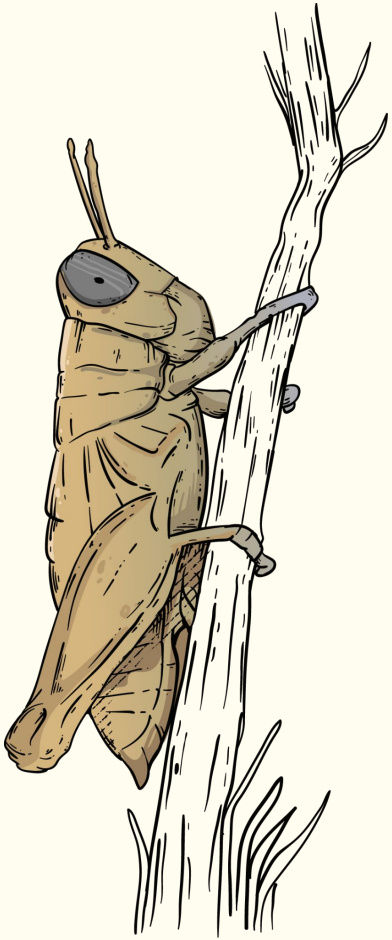
Watch a video uploaded by biointeractive titled, **“Selection for Tuskless Elephants”** and answer the following questions below:

1. What caused the decline of the elephant population in Mozambique?
2. What is the importance of “tusks” in the elephants?
3. Why was being “tuskless” a biological advantage for the elephants specifically during the civil war?
4. What will happen to the tusk size of future generations of elephants if poaching stops indefinitely?

Assignment: Selection for Tuskless Elephants

After watching the video about **“Selection of Tuskless Elephants,”** discuss your answer from the following questions:

1. What caused the decline of the elephant population in Mozambique?
2. What is the importance of “tusks” in the elephants?
3. Why was being “tuskless” a biological advantage for the elephants specifically during the civil war?
4. What will happen to the tusk size of future generations of elephants if poaching stops indefinitely?



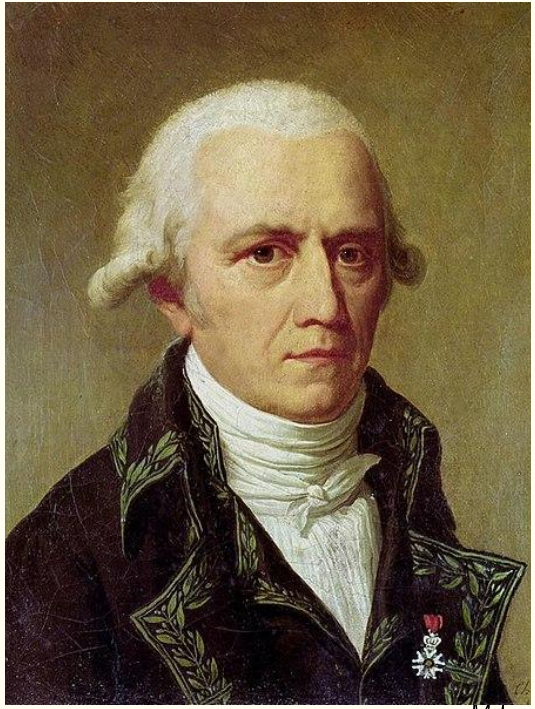
Poaching acts as a **selective pressure** that causes elephants to gradually adapt over time, driving **the process of evolution**.

Evolution

- Defined as ***descent with modification*** by Charles Darwin
- Can also be defined as a **change in the genetic composition** of a population from generation to generation.

Jean-Baptiste de Lamarck

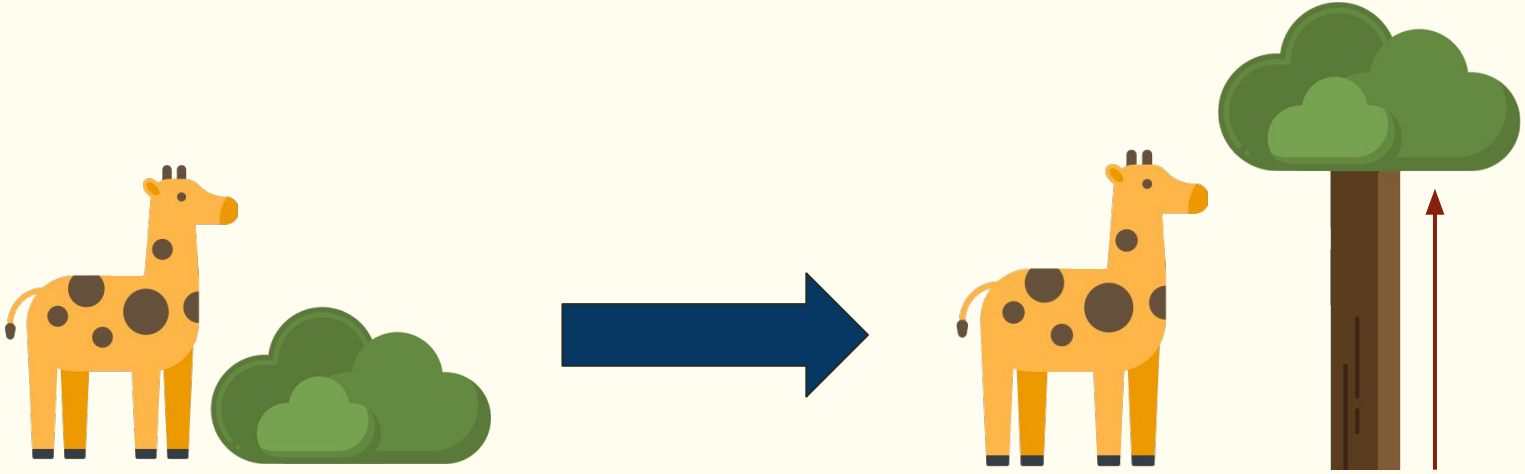
- A French biologist who suggested that **life evolved as environments change**
- Proposed the **hypothesis of evolution** or **Lamarckism** that follows two principles:
    - Use and disuse
    - Inheritance of acquired characteristics



Use and Disuse

- Organism develop based on **their environmental needs.**
- Parts of the body used extensively become larger and stronger, while those that are not deteriorate.

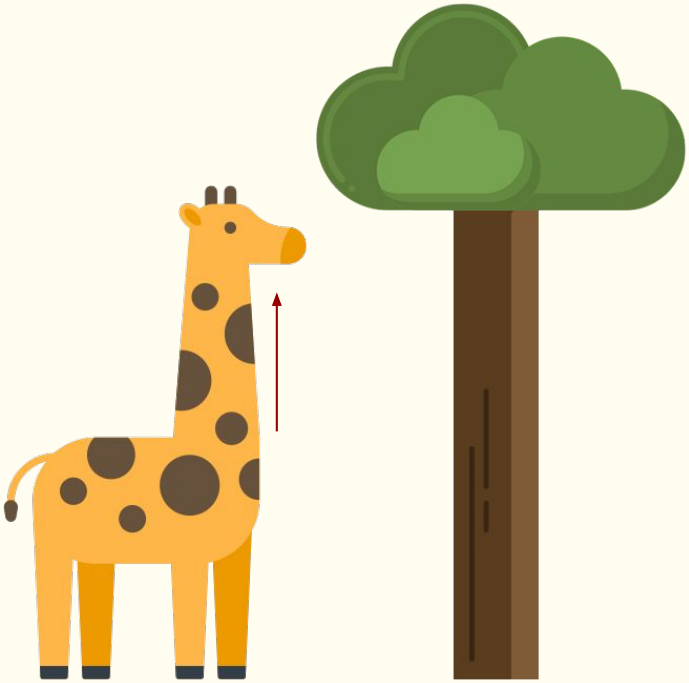
Use and Disuse



An ancestor giraffe with a short neck is eating short plants.

If plants gradually grow taller, what would the giraffe do to reach its food?

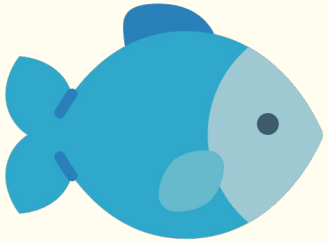
Use and Disuse



Principle of Use

The giraffe will stretch its neck **extensively** to reach tall plants and generations later it **will gradually get longer**.

Use and Disuse



An ancestor fish living beneath the ocean.

If the fish lives in a dark place, what would happen to their senses?

Use and Disuse

Principle of Disuse

The fish will **gradually lose its sense of sight** as the animal **doesn't uses it** to survive in a low light environment.

Inheritance of Acquired Characteristics

- Traits an organism acquired during its lifetime can be passed on to its offspring.

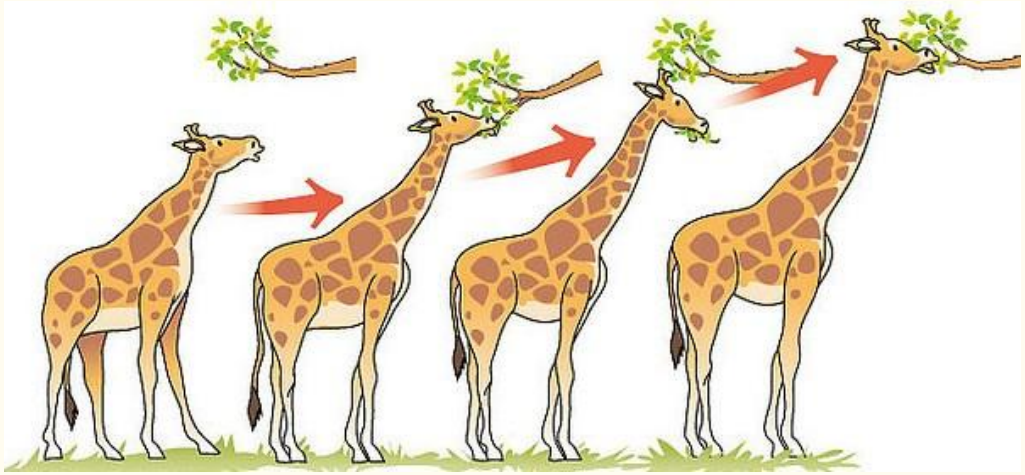
What are some examples of traits that you can acquire during your lifetime?

- **Skills:** reading, cooking, drawing
- **Physical:** piercings, bodybuilding results, scars, artificial hair color

Checkpoint

If a giraffe frequently uses its neck during its lifetime to reach food from tall trees, what trait would its offspring inherit according to Lamarckism?

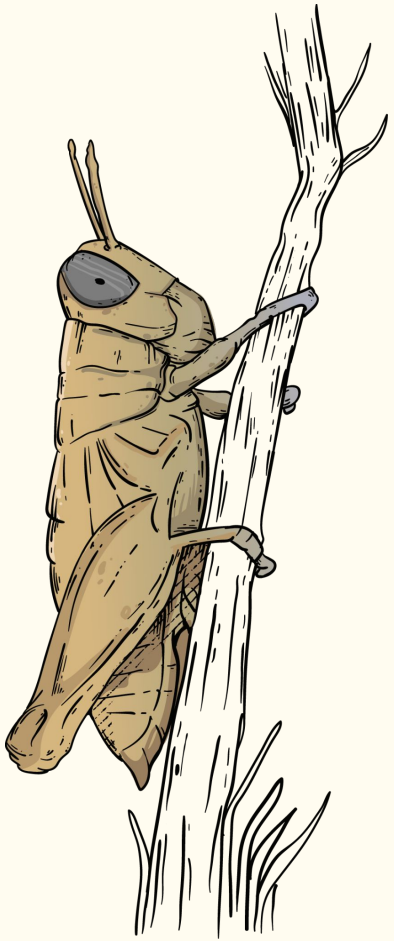
(The offspring will inherit a longer neck than its parent)



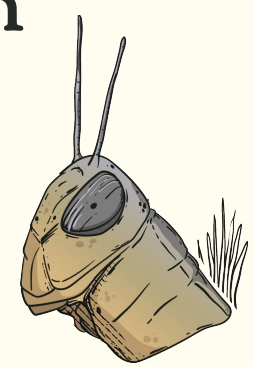
Checkpoint

According to Lamarckism, if an individual loses a limb due to injury during its lifetime, what trait would its offspring inherit?

(The offspring will have a shorter limb)

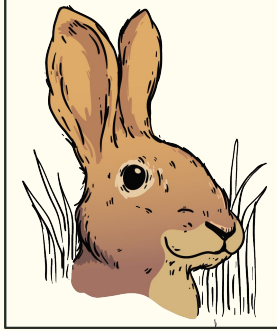


Based on the two principles, what is the biggest limitation of Lamarck's Hypothesis of Evolution?



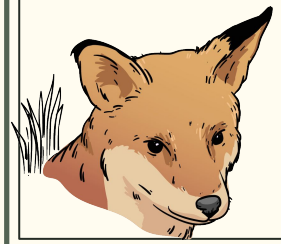
Limitation of Lamarck's Hypothesis

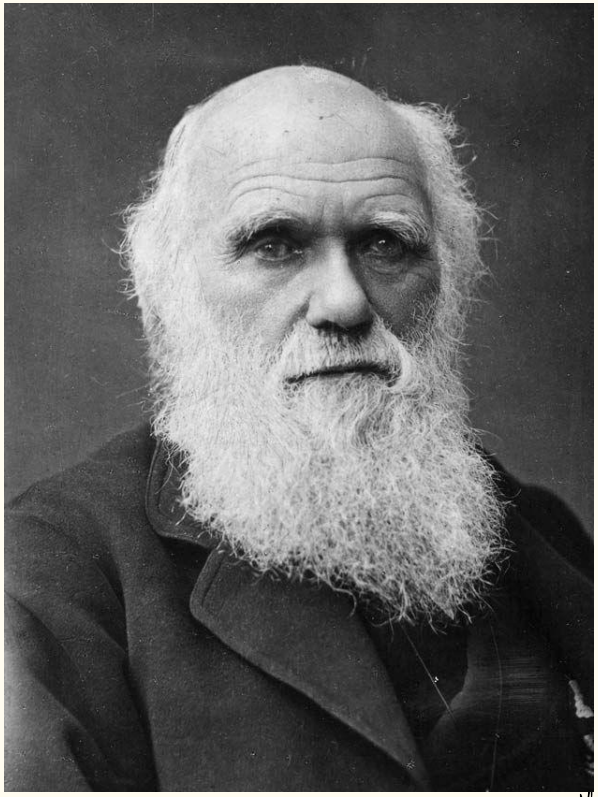
- Traits that are **acquired in an individual's life cannot be inherited.**
- **Example:**
  - A man who builds his muscle by lifting weights will not have an offspring with bigger or stronger muscle.



Charles Darwin

- An English naturalist who published **“On the Origin of Species”** in 1859
- He proposed that species **adapt** from a changing environment by the process of **natural selection**.





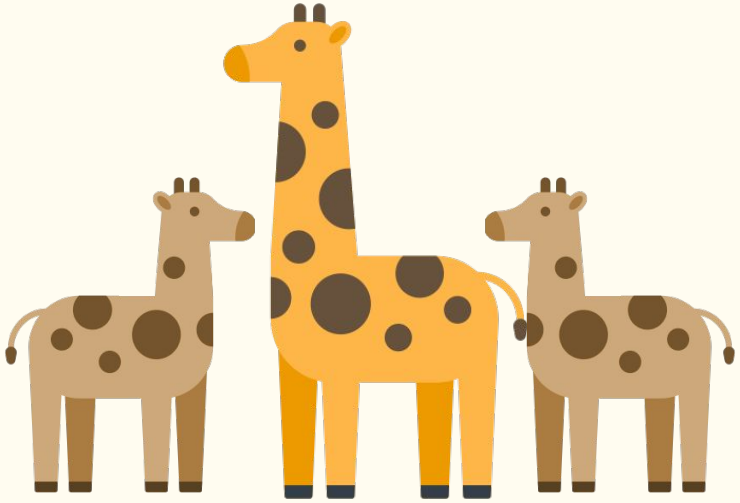
Natural Selection

- A process where individuals with **well-adapted traits** are more likely to **survive and pass on those traits** to the next generation.
- Changes acquired by an organism during its lifetime **do not contribute** to the evolution of its species.

Mechanism of Natural Selection

1. Variation

- A new individual from the same species emerge due to a **mutation.**
- **Example:**
  - In a population of short-necked giraffe, a *randomly mutated* offspring is born with a longer neck.



Mechanism of Natural Selection

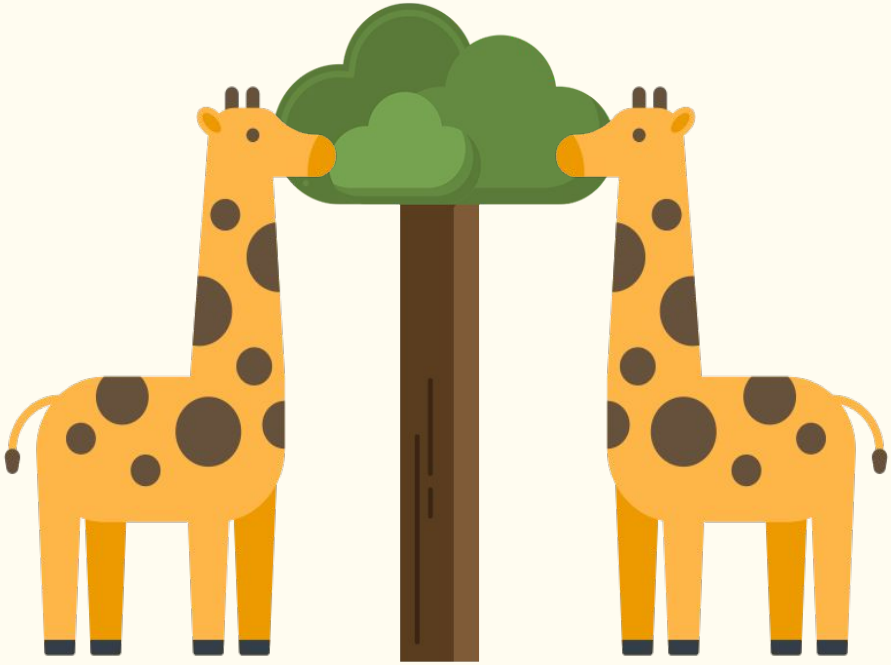
2. Survival of the Fittest

- Which of the two variation of giraffe are more likely to survive in an environment with tall trees?

(Long-necked giraffes are more likely to survive because their trait is suited to the environment.)

Survival of the Fittest

Species who are **able to adapt and adjust** to **a changing environment** will survive and reproduce.



“In the struggle for survival, the fittest win out at the expense of their rivals because they succeed in adapting themselves best to their environment.” (Garson O’Toole)

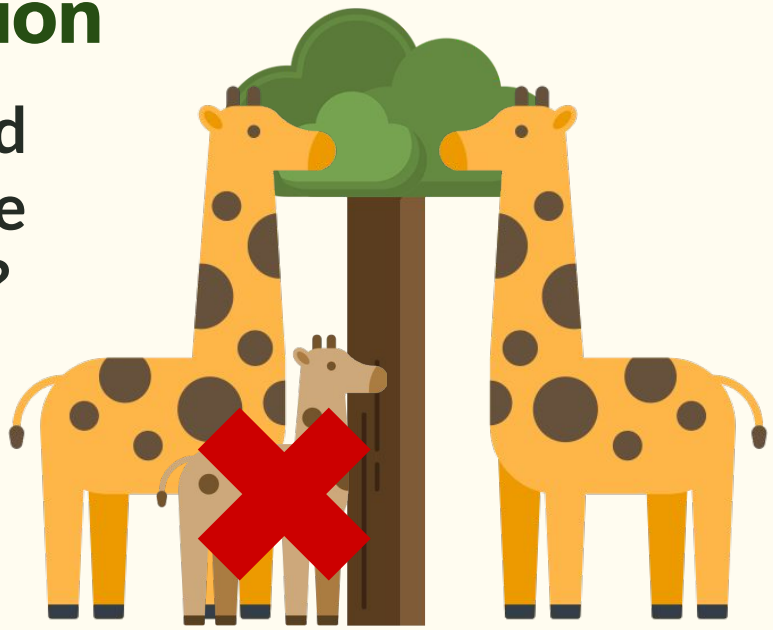
- How can you relate Garson’s quote to your everyday life as a MCHS student?
- What Miriam value/ideal fits in the quote?

Mechanism of Natural Selection

3. Inheritance and Adaptation

- What happens to short-necked giraffes if long-necked ones are more fitted to the environment?

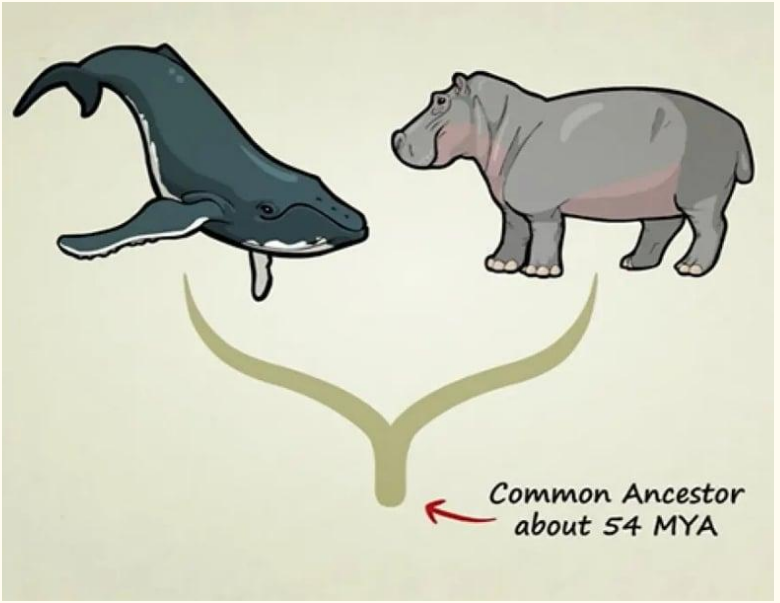
(Long-necked giraffes gradually replace short-necked ones because their traits help them survive and reproduce in the environment.)



Mechanism of Natural Selection

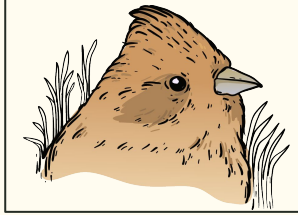
3. Inheritance and Adaptation

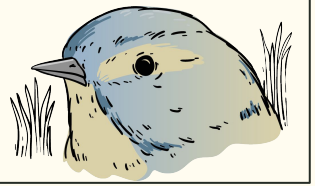
- **Advantageous trait** will be inherited to the **next generation** of the population.
- Inherited variations in traits can give rise to new species.
    - **Example:** whales and hippos share a common ancestor.



Keep in mind

- Individuals do not evolve, but rather the **whole population evolves over time**.
  - Process of natural selection occurs through the interaction between individual organisms and their environment.





Looking Back

1. Reflecting on the laboratory activity, which feeding mechanism is more effective? **(Spoon)**
2. If each feeding mechanism represents a variation within a species, what will happen to the species' overall population?

(The spoon will gradually replace the population of the species)

Variation of finches have different beak shape based on their diet

Common ancestor of finch

Cactus Diet

Seed Diet

Geospiza scandens

Geospiza magnirostris

Looking Back

3. If each bead represents a prey, how does the color of the habitat affect the number of prey eaten?

(The prey that blends in with the environment survives)

Camouflage is a product of natural selection

Deadleaf moth
(*Oxytenis modestia*)

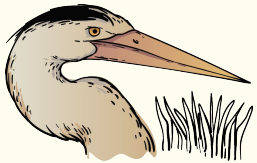
Buff-end moth
(*Phalera bucephala*)

Common octopus
(*Octopus vulgaris*)

Evolution of Dogs

Dogs evolved from the common ancestor of wolves due to domestication. If dogs evolved from wolves, why do wolves still exist? Discuss your answer with your seatmate.

Reminders



Reminders

- LE 3.2: Population Dynamics **(December 12, 2025 - F)**
  - Kindly wear a PE uniform for the laboratory experience
- Quiz 3.1 **(December 17, 2025 - W)**
  - Theories of Evolution
  - Patterns and Pieces of Evidence that Support Evolution
  - Population Ecology and Growth
  - Community and Ecosystem

References

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- Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Orr, R. B. (2021). *Campbell Biology*. Pearson.