



ECOLOGICAL EVOLUTION



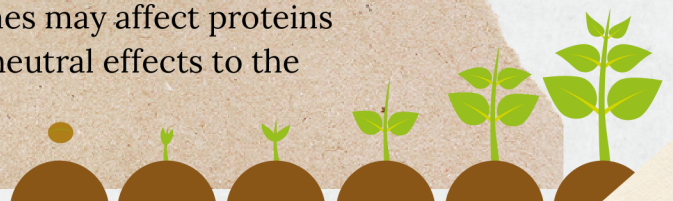
BACKGROUND



Ecological niches represent the multidimensional roles and relationships an organism occupies within its ecosystem. These niches utilizes **biotic**, also known as living things such as plants or animals, and **abiotic** factors such as sunlight, air, soil. These play a role in habitat requirements, **resource utilization**, and **interactions** with other species. Each species holds a unique ecological niche, which may be characterized by its specific dietary preferences, reproductive strategies, behavioral patterns, and tolerance to environmental conditions. Every species undergo **natural selection** where the more adapted they are to their environment, the more likely they are to survive and reproduce. This is due to genetic components that result in random chance which can alter roles in ecological niches. This lesson plan will aid in helping students learn about **different types of natural selection, symbiosis, species interactions, and genetic influences.**

NGS STANDARDS

- MS-LS2-1: Ecosystems: Interactions, Energy, and Dynamics
 - Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS3-1. Heredity: Inheritance and Variation of Traits
 - Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.





ECOLOGICAL EVOLUTION



MATERIALS

- PowerPoint
- Quizziz Game
- Selection Matching Playing Card Set



ACTIVITIES AND TIMELINE

- 10 minutes - Introduce PowerPoint and key concepts
 - Explain terms and why natural selection may be occurring
- 10 minutes - Play Quizziz Game
 - This is used to reinforce the new knowledge and apply these concepts in the real world
- 10 minutes - Selection Matching Game
 - Goal: To identify differences between different types of selection and symbiosis
 - Students receive a packet of cards consisting of different types of animals, symbiosis, and selection. Have students work on it individually, but encourage group discussion
 - Students will need to match two organisms together based on a symbiotic relationship (mutualism, commensalism, or parasitism). They will then place the term on each pair
 - Next, for each organism there is a trait that is specific to them. Identify what type of selection may be occurring and put a selection token down (stabilizing, disruptive, or directional).
- 5 minutes - Go over answer key and explain any additional terms and processes
- 5 minutes - Go over findings and what they have learned



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KEY TERMS

These are key terms and definitions if needed:

- **Ecological Niche** - The relationship between species in a given environment along with biotic and abiotic factors affecting them; the functional role they hold in the community
- **Natural Selection** - An organism that is more adapted to a particular environment are more likely to survive and reproduce
 - Composed of Directional, Stabilizing, Disruptive Selection
- **Symbiosis** - The relationship between two or more species
- **Genetic Drift** - Random change in allele frequencies in a given population, especially smaller populations



DISCUSSION QUESTIONS

- Where do you see selection playing a role in your daily life?
 - Ex: Birds building nests in campsites
- Can you think of any way that natural selection may have affected us as humans?
 - Ex: Milk consumption
- How does living in a city versus the country play a role in natural selection and ecological niches?
 - Ex: Industrial Revolution moths



FLASHCARDS





FLASHCARDS



MUTUALISM

DIRECTIONAL

DIRECTIONAL

MUTUALISM

DIRECTIONAL

DIRECTIONAL

COMMENSALISM

DIRECTIONAL

STABILIZING

COMMENSALISM

STABILIZING

STABILIZING

PARASITISM

STABILIZING

STABILIZING

PARASITISM

DISRUPTIVE

DISRUPTIVE

DIRECTIONAL

DISRUPTIVE

DISRUPTIVE

STABILIZING

DISRUPTIVE

DISRUPTIVE





FLASHCARDS



TICKS ARE EITHER IN YOUR HAIR OR ON YOUR BODY

HUMANS HAVE A LOT OF VARIATION BUT MOST STAY THE SAME EVOLUTIONARILY

BUFFALO HAVE ONLY CHANGED MINORLY IN THE LAST THOUSANDS OF YEAR

SPIDERS WITH MORE RESISTANCE TO POISON ARE MORE LIKELY TO SURVIVE

TREES ARE ABLE TO HAVE LEAVES OR PINES

BATS WITH AN AVERAGE DIETARY SPECIALIZATION ARE MOST LIKELY TO BE COMMON IN THE POPULATION

FROGS ARE MORE LIKELY TO SURVIVE IF THEY MATE EARLIER

MOSQUITOS WHO ARE MORE RESISTANT TO INSECTICIDES SURVIVE LONGER





FLASHCARDS



CALABASH (THE GREEN PLANT) WHO ARE NOT TOO BIG OR TOO SMALL ARE MORE LIKELY TO SURVIVE

EPIPHYTES (THE PINK PLANT) CAN BE FOUND IN EITHER TEMPERATE ZONES OR IN THE TROPICS

RETRIEVER DOGS CAN EITHER BE YELLOW OR BLACK LABS

CATTLE EGRETS (THE BIRD) WITH MORE ELABORATE COURTSHIP DISPLAYS ARE MORE LIKELY TO MATE





ANSWER KEY



SYMBIOSIS

- Humans are paired with Mosquitos - **Parasitism**
 - Mosquitos draw blood from humans leading to diseases such as malaria
- Buffalo are paired with Cattle Egret (Bird) - **Commensalism**
 - Cattle Egrets eat insects off the buffalo while they are grazing
- Golden Retriever is paired with tick - **Parasitism**
 - Ticks infect dogs and cats leading to possible tick-borne diseases
- Frog is paired with Spider - **Mutualism**
 - The spider provides the frog with protection while the frog eats pests that could harm the spider's eggs
- Epiphyte (Pink Plant) paired with tree - **Commensalism**
 - Epiphytes get sunlight and nutrients from the host plant
- Calabash (Green Plant) paired with bat - **Mutualism**
 - Bats are able to pollinate calabash leading to their growth while bats receive nutrients from calabash

SELECTION

Humans - Stabilizing Selection
Mosquitos - Directional Selection
Tick - Disruptive Selection
Dog - Disruptive Selection
Buffalo - Stabilizing Selection
Tree - Disruptive Selection

Cattle Egret (Bird) - Directional Selection
Epiphyte (Pink Plant) - Disruptive Selection
Calabash (Green Plant) - Stabilizing Selection
Bat - Stabilizing Selection
Spider - Directional Selection
Frog - Directional Selection



CITATIONS AND ACKNOWLEDGEMENTS



ECOLOGICAL NICHES

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