MODULE 1:
Natural Selection Theory

7TH AND 10TH GRADE

Minnuette Rodríguez Harrison

María L. Ortiz Hernández

CSMER
CENTER FOR SCIENCE AND MATH EDUCATION RESEARCH

LEARNING OBJECTIVES

Through this module, the participant will:

- given a situation, predict the availability of a species facing its predator.
- explain the concepts: natural selection theory, biodiversity, species, adaptation, biological interaction (predator – prey relationship)
- establish how human intervention could contribute or affect the availability of a species
- establish Darwin's route that propitiated his Natural Selection Theory.

Are there any similarities between some of these organisms?

A

B

C

D

E

F

G

Beginning:

What makes these organisms similar?

What makes them different?

Do they belong to the same species?

These organisms are similar in that they:

- are butterflies
- have wings
- have antennae
- can fly
- are insects

These organisms differ in:

- the color of their wings
- the shapes of their wings and bodies

These butterflies belong to **different species**.

What is a species?

- All organisms have specific traits that distinguish them from another organism.
- The organisms that share traits are said to belong to the same **species**.
- Organisms from the same species may vary in some traits.
  - For example, the coloration of the plumage of some birds.
- A **species** is a group of organisms that can interbreed to produce fertile descendants (offspring that can also produce offspring).

What makes these organisms similar?
What makes them different?
Do they belong to the same species?

Asclepia currasavica

Asclepia currasavica

Both plants belong to the same species, but the flowers have a different coloration.

Both plants are a **variety** of the same species, thus, they present **morphological diversity**.

This means, that they vary in some trait of the species. In this case, the trait is the flower's color.

What do we understand by biodiversity?

- The word **biodiversity** means that we have a large variety of organisms in our Planet.

- Each of these organisms have some traits that distinguish them and let them survive in a place or environment.

- **Bio** (life), **diversity** (variety)

DEVELOPMENT

Activity #1: The most suitable mouse

Worksheet #1

Table I: *Effect of predation in a mice population throughout time*

Generation		Color				
Stage	# of mice	1	2	3	4	5
Start	Al the beginning	20	20	20	20	20
1	After first predation					
	After first reproduction					
2	After second predation					
	After second reproduction					
3	After third predation					
	After third reproduction					

Analysis questions:

1) Graph your data. What pattern can you identify with the obtained data?

2) What trait seems beneficial to survive in this environment? Explain.

3) Explain why the number of some mice increases throughout time, while the rest decreases.

4) How do you think these results could change if the experiment continues to a total of five predated generations?

Activity #2: Following Darwin's Footsteps

Worksheet #2

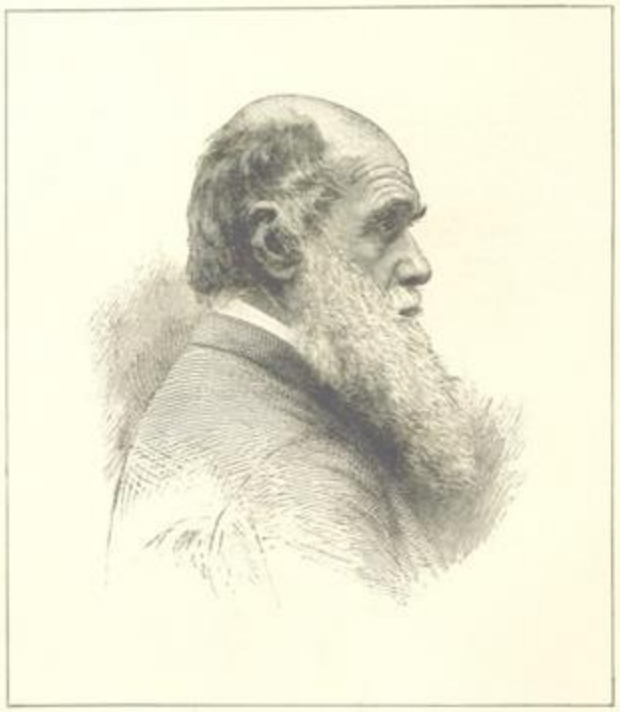
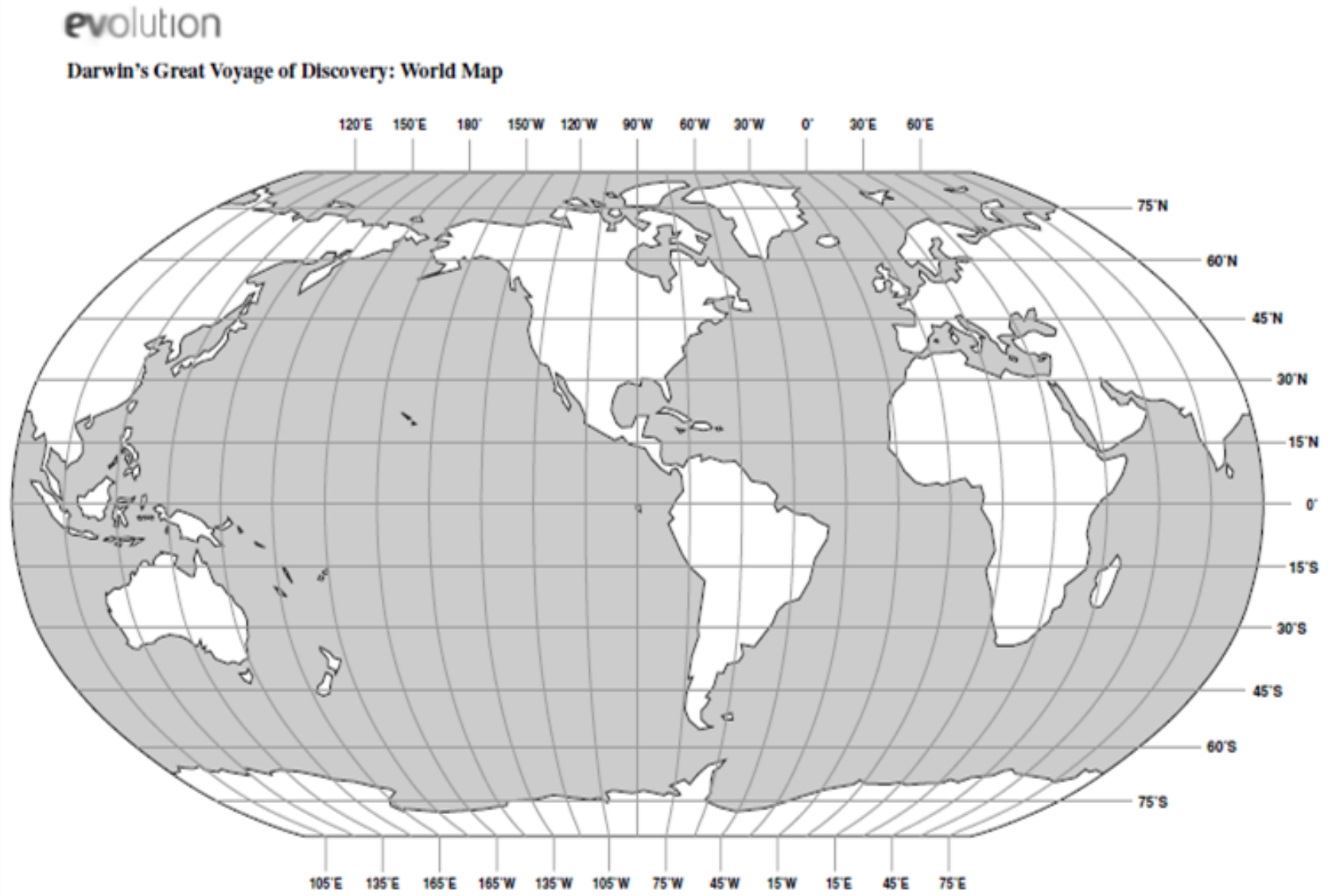


Table #1: Charles Darwin and his trip boarding the scientific ship *HMS Beagle*

Latitude	Longitude	Date and place	Events
50°N	4°O	December 27, 1831 Plymouth, England	Darwin embarks in the HMS (*Her Majesty's Ship*) Beagle as the captain's assistant.
14°N	23°O	January 16, 1832 Cape Verde Islands	Darwin makes his first observations. *"I realized that maybe I could write a book about the geology of the different countries I visited, and the idea excited me"*- Darwin's words.
23°S	43°O	February, 1832 San Salvador, Bahía, Brazil	Darwin explores tropical jungles for the first time.
55°S	73°O	September, 1832 Punta Alta, Argentina December, 1832 Tierra del Fuego, Argentina	Darwin is intrigued by the giant fossils he sees. For example, the fossil of a giant armadillo or *glyptodon*.
34°S	59°W	August, 1833 Río Negro, Argentina	Darwin explores the fertile lowlands called Pampas with the zone's natives, called "gauchos."
42°S 39°S 37°S	73°W 73°W 73°W	January-February, 1835 Chiloe Islands, Chile	Darwin witnesses Osorno's eruption while he's in Chiloe and experiments an earthquake in the forests near Valdivia.
0°S,	90°W	September-October, 1835 Galápagos Islands	Darwin finds many species of plants, birds, and turtles endemic to Galápagos, but they look mysteriously related to species in the continent. Among the many observed iguanas in Galápagos, the marine iguana is especially characteristic: no other iguana swims and feeds in the ocean. Intrigued, Darwin opens the stomachs from some of them and only finds seaweed! Many animals from Galápagos were as unusual as their habitat, and their colors often mimicked lava. Back in London, Darwin is shocked when he probes that the species group from Galápagos that he believed included many different birds, actually belonged to the same kind: finches.
33°S,	151°E	January, 1836 Sydney, Australia	Marveled by marsupials, Darwin asks himself why there is a completely different group of mammals in Australia.
12° S,	96° E	April, 1836 Coconut Islands	Darwin studies coral reefs that grow around the islands to probe his theory regarding atoll formation.
20°S,	57°E	May, 1836 Mauritius	*"I took a quiet stroll along the north coast of the city; the plain, almost uncultivated, consists of a black lava field covered with coarse grass and shrubs, most of which are mimosa"* words according to Darwin's observations.
50°N	5°W	October 2, 1836 Falmouth, England	"Last night, late, I arrived home. I find myself confused with so much joy." – Darwin's words after returning.

World map with coordinates



Activity #3: Darwin’s great idea

Worksheet # 3

The environment cannot sustain an unlimited growth in population (differential reproduction).

_____

_____

_____

_____

_____

Surviving brown beetles have additional brown beetle offspring.

_____

_____

_____

_____

_____

There is a diversity of traits.

_____

_____

_____

_____

_____

The most advantageous trait turns into the most frequent one among the population.

_____

_____

_____

_____

_____

Closure:
What do you understand by natural selection?

- It is the **process** through which inherited traits help organisms survive.
- Natural selection tends to preserve beneficial adaptations in populations and eliminate harmful ones.
- Survival of the fittest.