

## Topic 10: Adaptation → Evolution

SCI141

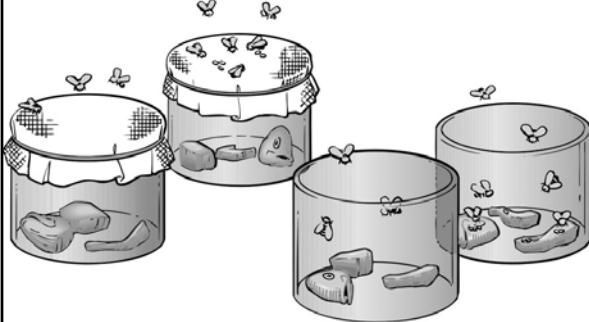
### Objectives

- Describe different theories about how life may have started on earth.
- Describe natural selection.

What does a bird look like?

How did life begin on earth?

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### Origins

1. Extraterrestrial Theories
2. Earth Origin Theories
  - A. Heterotroph Origins
  - B. Autotroph Origins

## Origins

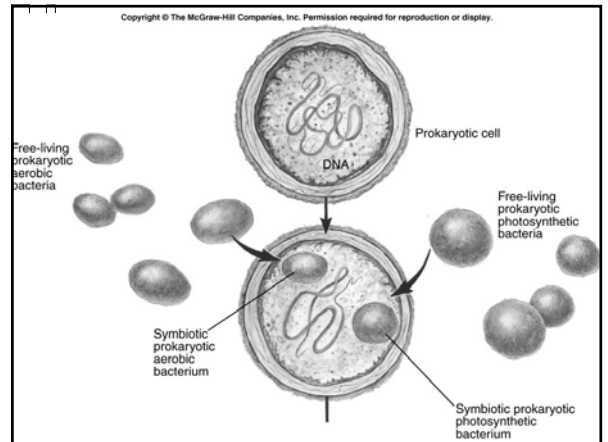
- What was the earth like?
  - Not much oxygen
  - Extreme environments (pH, temperature)

## Origins

- Did RNA come first?
  - RNA is more like the predicted early chemicals.
  - RNA can be copied without enzymes
    - Viruses (retroviruses) can contain DNA or RNA

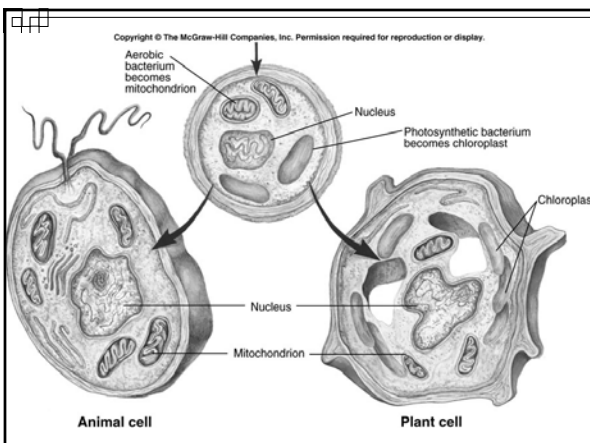
## Origins

- Endosymbiotic Theory



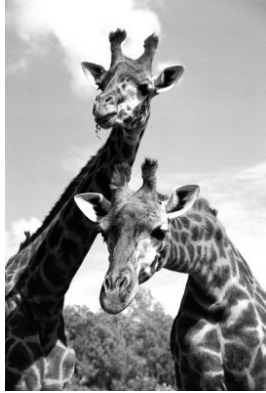
## Evolution

- Continuous adaptation of a population to its' environment over time.



## Example

- Giraffes



## Responsive Processes

- Picture millions of years ago...
- Trees grow higher
- If you (a giraffe) want to eat the leaves from trees you need a long neck. (or you need to be taller...)

## Responsive Processes

- Individuals cannot make their necks longer.
- Some giraffes in the population may have a longer neck:
  - They eat more food, live longer → reproduce better → More giraffes have longer necks

## Darwin's Voyage

- At age 22, Charles Darwin began a five-year, round-the-world voyage aboard the *Beagle*
- In his role as ship's naturalist, he collected and examined the species that inhabited the regions the ship visited

## Voyage of the Beagle

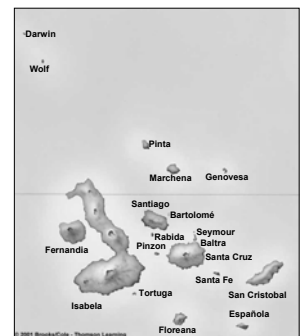


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## Galapagos Islands

Volcanic islands far off coast of Ecuador

All inhabitants are descended from species that arrived on islands from elsewhere



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## Galapagos Finches

- Darwin observed finches with a variety of lifestyles and body forms
- On his return, he learned that there were 13 species
- He attempted to correlate variations in their traits with environmental challenges

## Darwin's Theory

A population can change over time when individuals differ in one or more **heritable** traits that are responsible for differences in the ability to survive and reproduce.

## How do we get variation?

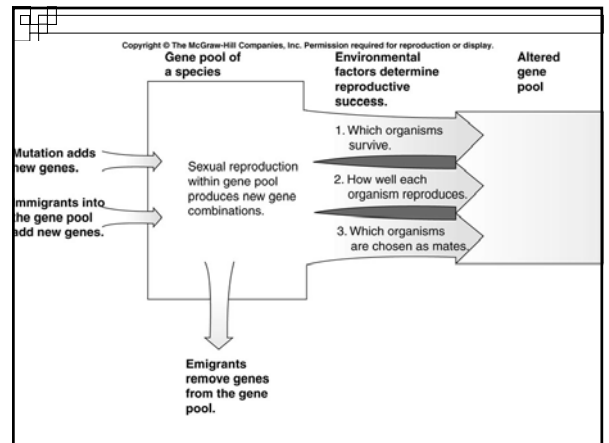
- Remember → Two alleles/gene
  - Spontaneous mutations

## Question?

- Can a learned skill, like being a great tennis player, be passed on to a next generation?

## What drives Natural Selection?

1. Differential Survival
2. Differential Reproductive Rates
3. Differential Mate Selection



# NS Demo

# How might this actually work?

