

EVOLUTIONARY PATTERNS AND PROCESSES



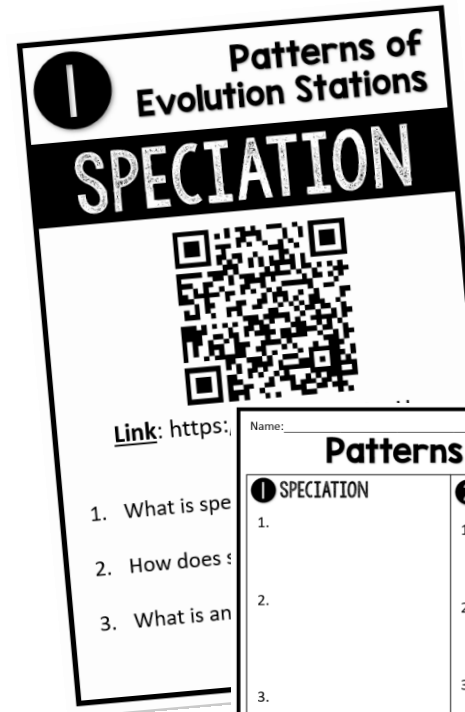
Introduction

- More than 99% of all life forms that ever lived are now extinct (based on fossil record).
- The emergence, growth, and extinction of larger clades (a group of organisms believed to have evolved from a common ancestor) are examples of macroevolution.



Introduction

- There are several broad patterns of evolution observable in nature:
 - speciation
 - extinction
 - gradualism
 - punctuated equilibrium
 - divergent evolution
 - convergent evolution
 - coevolution



Name: _____ Date: _____

Patterns of Evolution Stations

① SPECIATION	② EXTINCTION	③ GRADUALISM
1.	1.	1.
2.	2.	2.
3.	3.	

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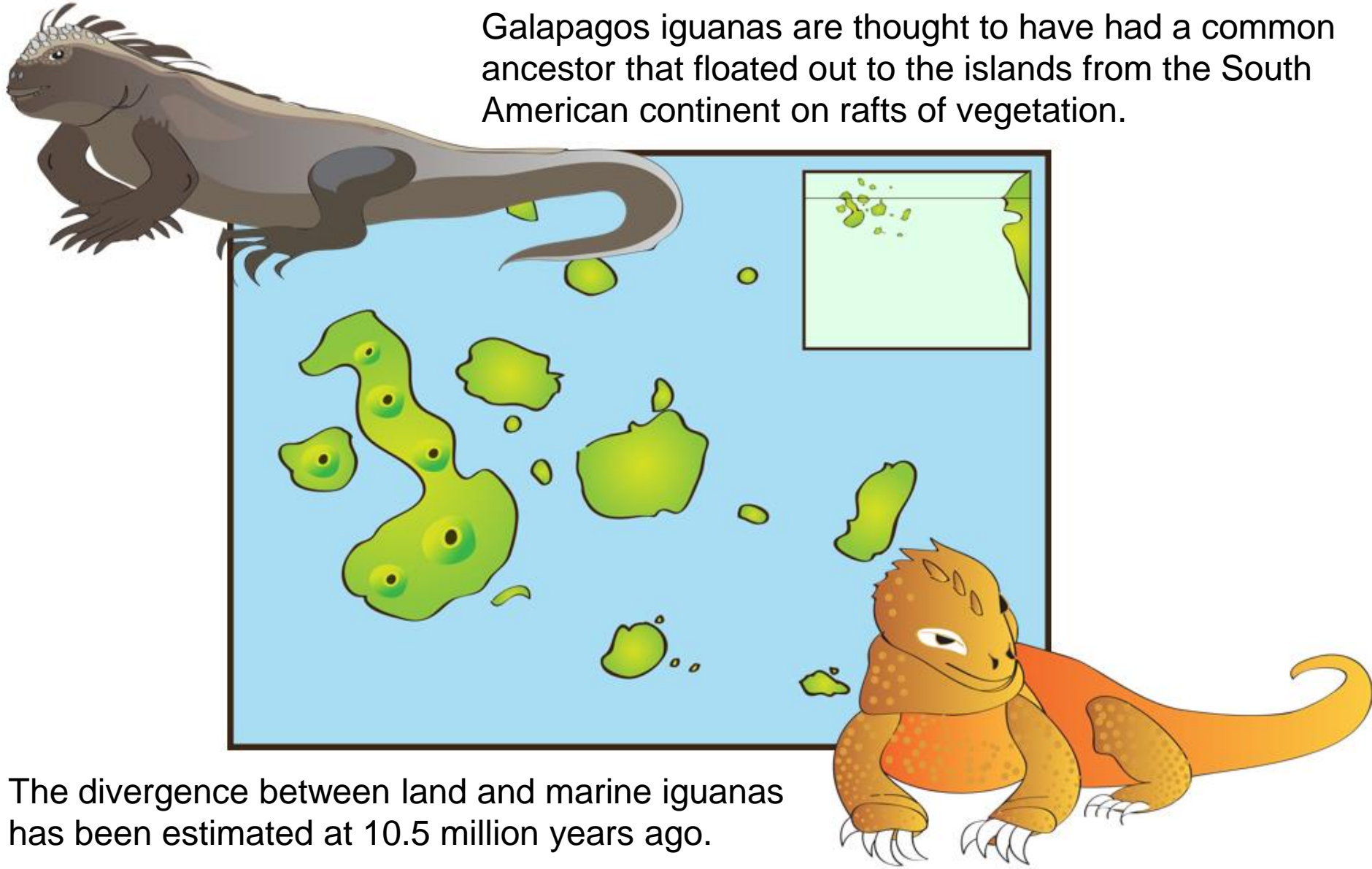
Evolutionary Patterns

Speciation

- **Speciation** - Speciation is the evolutionary process by which populations evolve to become distinct species.
 - Some sort of isolation must occur.
 - Gene pools gradually become different & are no longer able to reproduce.
 - At this point the 2 groups are different species.

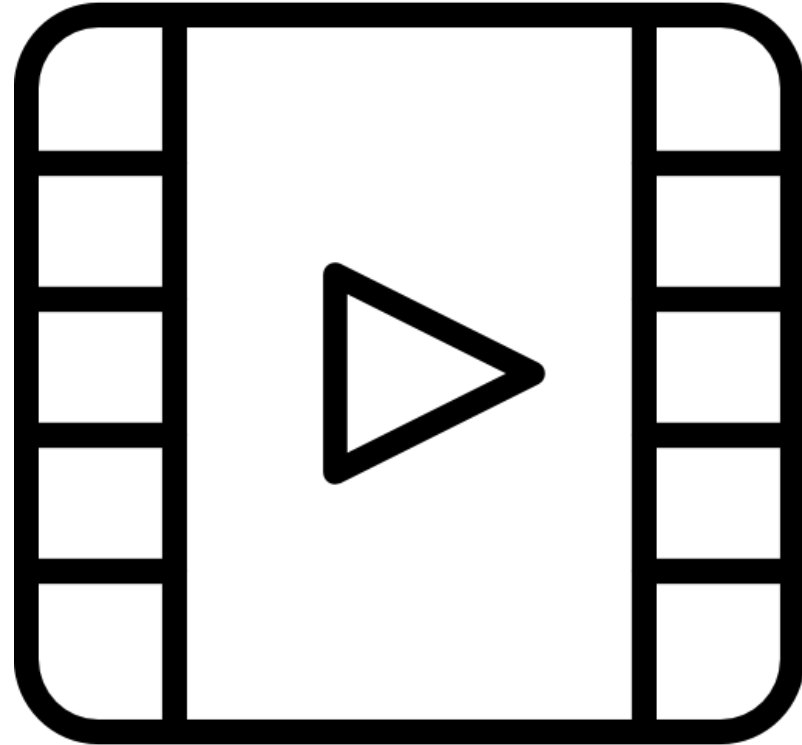
Speciation

Galapagos iguanas are thought to have had a common ancestor that floated out to the islands from the South American continent on rafts of vegetation.



The divergence between land and marine iguanas has been estimated at 10.5 million years ago.

Example of Speciation



Video Link:

<https://www.youtube.com/watch?v=EmtlofdeUbc>

Extinction

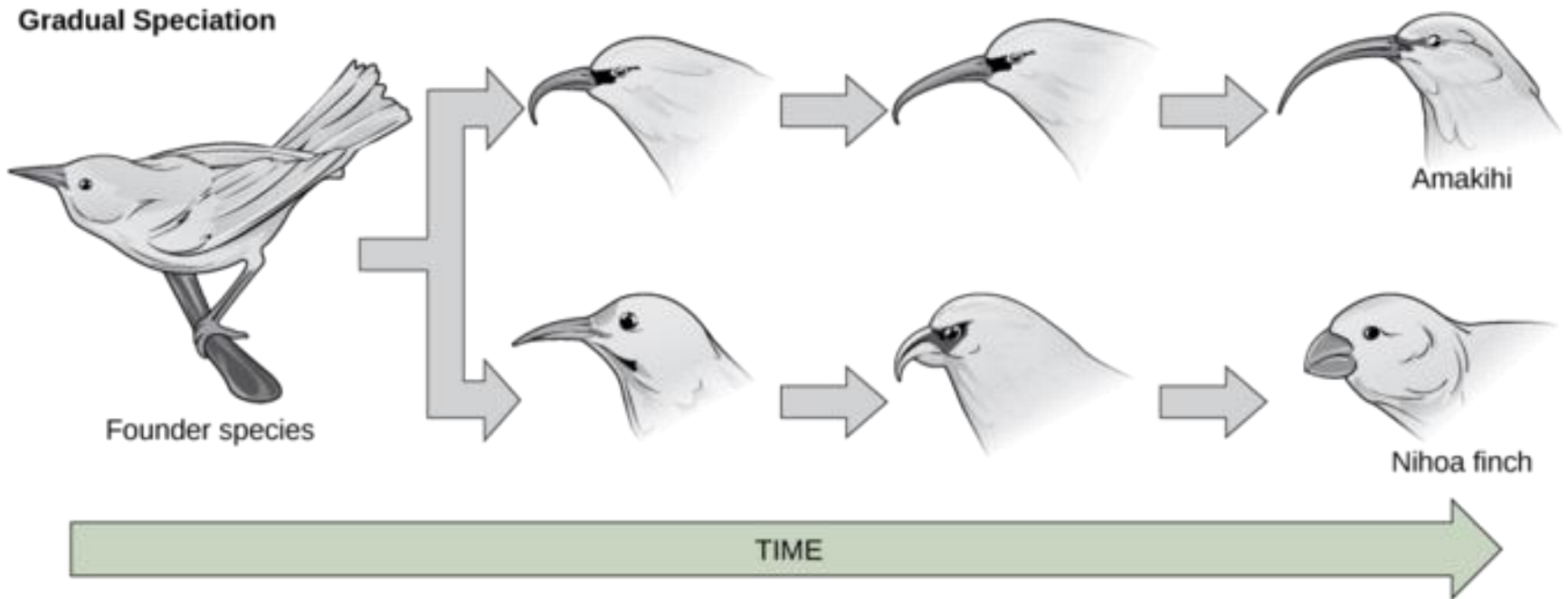
- **extinction** - elimination of a species
 - **gradual extinction** - occurs at a slow rate
 - ex: changes in environment (drought), natural disasters
 - **mass extinction** - occurs when a catastrophic event changes the environment suddenly
 - ex: massive volcano, meteor, tsunami



Rate of Evolution

Gradualism

- slow, constant changes over a long period of time
 - ex. Gradual evolution of bird beaks over long periods of time



Punctuated Equilibrium

- bursts of change followed by periods of stability



Ex. One group of coral-like sea organisms, called bryozoan, shows this kind of pattern. The well-preserved fossil record of bryozoans shows that one species first appeared about 140 million years ago and remained unchanged for its first 40 million years. Then there was an explosion of diversification, followed by another period of stability for vast amounts of time.

Macroevolutionary Patterns

Divergent Evolution

- when closely related species evolve in different directions, and become increasingly different
 - New environments caused differences to evolve in populations.
 - Ex. The kit fox and the red fox are closely related but look different.



Convergent Evolution

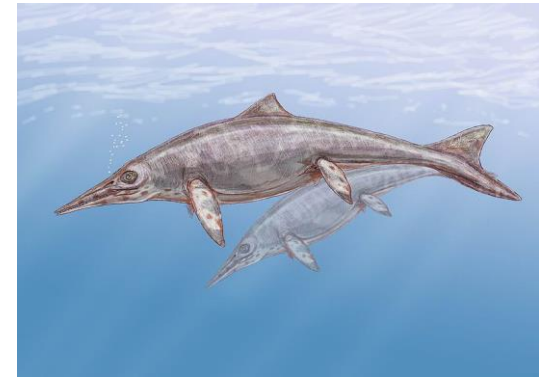
- when unrelated species evolve similar characteristics because they live in similar environments.



shark - fish



dolphin - mammal



ichthyosaur - reptile

Ex. Although all of these animals swim, none are actually related ancestrally.

Coevolution

- occurs when species evolve together
- often happens in species that have symbiotic relationships
- ex. flowering plants and their pollinators

