

Notes: Evolution Chapter 1

<p>Early Life on Earth</p>	<ul style="list-style-type: none"> • _____ billion yrs ago, all organisms lived in the _____ • Fossils provide evidence of _____ <ul style="list-style-type: none"> - Many _____ types - _____ = relative age (layers) and _____ age (radioactive dating). - _____: info about fossils in a certain _____ <ul style="list-style-type: none"> • can show periods of time when certain species _____ and died
<p>More Complex Organisms Developed over Time</p>	<ul style="list-style-type: none"> • Development of _____ organisms is in fossil records • _____ organisms: _____-celled organisms <ul style="list-style-type: none"> - Some produced _____, which put more oxygen into our atmosphere (early on, there was very _____ oxygen) • _____ organisms: _____ than one cell <ul style="list-style-type: none"> - arrived in the _____ ~ 1.2 billion yrs. ago - cells perform different tasks (_____) - earliest were tiny _____
<p>Life On Land</p>	<ul style="list-style-type: none"> • Without _____, living things can't _____ • Life moved from the ocean to _____ about _____ years ago, but still needed water <ul style="list-style-type: none"> - first land-dwelling organisms were simple _____ (with roots to absorb water) and fungi - _____—plants provided them food and shelter, then amphibians and _____, then birds and mammals evolved.
<p>Stop and Think:</p> <p>1. Describe the first life on Earth in 3 words.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>2. How do we know the progression of life on Earth?</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	
<p>Earth's History Includes Mass Extinctions</p>	<ul style="list-style-type: none"> • _____: period when huge numbers of species die/become _____ in a short time • many have happened, but there are _____ main mass extinctions: • _____ Extinction: ~ _____ million years ago, ~ _____ % of _____ life and most _____ animals disappeared <ul style="list-style-type: none"> - _____ formed, which would have changed _____ and water conditions—this could have caused the _____ - Scientists also think the extinction could have been caused by _____ activity
<p>Mass Extinctions: Cretaceous Extinction</p>	<ul style="list-style-type: none"> • ~ _____ million years ago, fossil records for dinosaurs and more than _____ % of other species living on Earth stop. <ul style="list-style-type: none"> - Many scientists think that a large _____ collided with Earth, and this is what caused the extinction—there is a _____ off the coast of Mexico from a meteorite impact, and _____ of the meteorite have been found in the area. - Afterwards, _____ species developed and flourished
<p>Scientists Explore the</p>	<ul style="list-style-type: none"> • Evolution: the process through which species _____ over _____. - Evolution results from a _____ in the genetic material of an organism and is passed from one generation to the next.

Concept of Evolution	<ul style="list-style-type: none"> The first scientist to propose a model of how life _____ was Jean Baptiste de Lamarck. <ul style="list-style-type: none"> He based his model on the _____. He said that an organism can acquire a _____ trait during its _____ and pass it along to its _____. Ex. Giraffes (long necks were a result of _____ to reach leaves) His theory had no _____ to support it and was discredited (he was _____). However, in the last few years, scientists have found evidence that certain <u>things</u> can affect our genome without changing our actual _____ (epigenetics).
Charles Darwin	<ul style="list-style-type: none"> He was a _____ naturalist that traveled with the British navy for 5 years, observing _____ and animals in _____ (the Galapagos), Australia, and the _____ (Madagascar). He compared _____ animals he saw with ones from _____. On the Galapagos Islands, plants and animals not only _____ from those he saw on the mainland, but sometimes differed from island to _____. Some organisms he studied include _____ and _____ (birds). He said living things evolve through _____.
Stop and Think: 1. If humans were to die out in 2012, would you consider this a mass extinction? Why or why not? 2. Summarize the history of the theory of evolution.	
Natural Selection	<ul style="list-style-type: none"> Natural Selection explains how living things _____. <ul style="list-style-type: none"> After Darwin analyzed his findings, he developed his hypothesis by _____. His hypothesis is based on a process called _____ selection, in which organisms that have certain desired _____ are allowed to mate with other organisms. <ul style="list-style-type: none"> Example: Different _____ of dogs In nature, a process called _____ selection occurs. In natural selection, members of a species that are _____ suited to their environment _____ and _____ at a higher _____ than other species' members. Natural selection is based on _____ key principles: overproduction, variation, adaptation, and selection.
Overproduction	<ul style="list-style-type: none"> Overproduction occurs when a plant or animal _____, it usually makes more offspring than the environment can _____. This is to ensure that some of the offspring will _____ long enough to grow into an adult and reproduce. <ul style="list-style-type: none"> Ex: Salmon lay _____ of eggs, but only a few _____ live to adulthood
Variation	<ul style="list-style-type: none"> Within a species, there are natural _____, or variations, in _____. These variations resulted from a change in the _____ material, known as a _____. The more genetic _____ there is in a population, the more likely it is that some of the individuals will _____ if the environment _____. Genetic variations are _____ on from _____ to offspring. <ul style="list-style-type: none"> Ex: A _____ might cause a fish to have a _____ tail
Adaptation	<ul style="list-style-type: none"> An adaptation is any _____ trait that gives an organism an _____ in its particular environment. <ul style="list-style-type: none"> Ex: Changing the tail _____ of a fish can help it swim _____.
Selection	<ul style="list-style-type: none"> Darwin concluded that organisms with _____ would survive long enough to _____, causing the adaptation to be more _____ in the offspring and future generations. _____ adaptations are "_____ for" in an environment. _____ individuals will show the adaptation from generation to _____. Ex: over time, fish with _____ tails make up the _____ of a group of salmon.
Summarize the Theory of Evolution	<ul style="list-style-type: none"> Darwin's Theory of Evolution says that living things _____ (or evolve) in response to _____ in their _____. <ul style="list-style-type: none"> All life is _____ and descended from a common _____. New species develop from _____ species. Organisms change through _____ selection: random genetic _____ occur within an organism's DNA, and the helpful mutations become more _____

	because they aid _____ and so are passed on to the next generation. Over time, helpful mutations accumulate and you end up with an entirely _____ organism.
Isolation and Speciation	<ul style="list-style-type: none"> • Speciation is the evolution of _____ species from an _____ species. This can occur when the environment _____ dramatically or _____. • _____ can cause many new species to evolve. Isolation of a species' populations can contribute to _____. <ul style="list-style-type: none"> – Isolation prevents populations from _____. As a result, genetic differences (_____) begin to add up in the _____ population. – Isolation leads to _____. – A _____ boundary like an ocean or _____ range can result in _____.
What is a Theory?	<ul style="list-style-type: none"> • Observations provide _____ for theories <ul style="list-style-type: none"> – Everyone makes _____; observations can lead to theories • _____ theory: a widely _____ statement based on observations and _____ that explains a group of _____. <ul style="list-style-type: none"> – _____ types of evidence that support evolution: _____, <u>Biological</u>, and Genetic
Fossil Evidence	<ul style="list-style-type: none"> • Fossils can show us how species are _____ <ul style="list-style-type: none"> – _____ information about fossils provides evidence that two species with a common _____ can develop differently in different _____. – Compare organisms that live _____ to organisms that lived in the _____. – You can also see small _____ in organisms through the rock layers and fossil _____. • Transitional fossils: fossils that show the _____ between one organism and another <ul style="list-style-type: none"> ▪ Ex: Archyaeopteryx: a fossil of a lizard-like organism with _____ shows the link between dinosaurs and _____. ▪ Ex: Tiktaalik: a fossil of a _____ that had _____ bones in its fins and had both _____ and gills. Shows the transition from sea to _____ • _____: an early form of an organism from which later forms _____ <ul style="list-style-type: none"> • Scientists comparing modern _____/algae and fossils of plants/algae can tell they share a common _____.
Biological Evidence	<ul style="list-style-type: none"> • Scientists are still studying animals in the _____ that Darwin observed; they are able to follow and record _____ changes as they are _____. • Antibiotic _____ in bacteria is evidence of _____; bacteria have _____ to be resistant • Helps to identify _____ between organisms • Includes the _____ and the _____ of organisms <ul style="list-style-type: none"> – _____ types of structural evidence: vestigial organs and homologous structures
Biological Evidence: Vestigial Organs	<ul style="list-style-type: none"> • Vestigial _____: physical structures that were used and developed in an _____ group of organisms but are _____ but aren't used in _____ organisms. <ul style="list-style-type: none"> – Ex. Humans have the remnant of a "_____, " suggesting our ancestors had _____. – Ex. _____ skeletons and bodies of _____ have traces of _____ structures.
Biological Evidence: Homologous Structures	<ul style="list-style-type: none"> • Homologous Structures: similar body _____ with different _____ <ul style="list-style-type: none"> – Scientists studying _____ of living things have noticed that many species share _____ structures, but that these structures are used _____ by each species (they have different functions) – Indicates that organisms have a common _____ with that structure – Ex: leg/forearm bones of lizards, _____, _____, cats, and _____ all have the same pattern of _____ bone → _____ bones → _____ of bones.
Biological Evidence: Development	<ul style="list-style-type: none"> • In the early stages of _____ (embryo), organisms look _____. • Look more _____ as they continue to develop and _____ • Evidence of a _____ ancestor • Ex. _____, rabbit, salamander, pig, and human _____ all have _____ • Scientists have found that many of the _____ that control fundamental steps of embryonic development — such as those that differentiate the _____ from the back of an organism, or those that lay out the pattern of _____ on a _____ — are the _____ among many animal species.
Genetic Evidence	<ul style="list-style-type: none"> • _____: genetic material found in all living things on Earth. <ul style="list-style-type: none"> – passed on to _____ – made up of _____ (G, C, A, T)

	<ul style="list-style-type: none"> - _____: segment of DNA that codes for a <u>trait</u> or function—each gene has a particular sequence of _____. • Studied to see how closely _____ some organisms are. • The more _____ there are in the sequence of _____ between two organisms, the more closely _____ they are. <ul style="list-style-type: none"> - Ex. Human and _____ <ul style="list-style-type: none"> • Almost all _____ found in a mouse are also found in _____ • _____ pattern/clock genes are very _____ • Pseudogenes: remnants of _____ that no longer _____. Humans have “pseudogenes” that have no function for us, but that are very _____ to genes in other animals that _____ have a function. <ul style="list-style-type: none"> - Ex: We have pseudogenes that are very similar to genes that produce _____ in egg-laying organisms. This suggests that we evolved from organisms that laid _____.
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Stop and Think:

1. What is the relationship between speciation and isolation?
2. Explain how a new species develops.
3. For each of the following, tell if they are examples of overproduction, variation, adaptation, or selection.
 - a. Giraffes with longer necks can reach higher in the trees, thereby getting more food, allowing them to have more offspring. _____
 - b. Deer with spotted coats are harder to see in the woods, making them less vulnerable to predators. _____ This allows them to live longer and produce more offspring, making spotted coats more common. _____
 - c. Some cats have longer tails, giving them better balance when they walk in high places. _____
 - d. Some dogs have pointed ears, others have ears that flop over. _____
 - e. Mice have about 10 babies per litter, but only a few will survive. _____