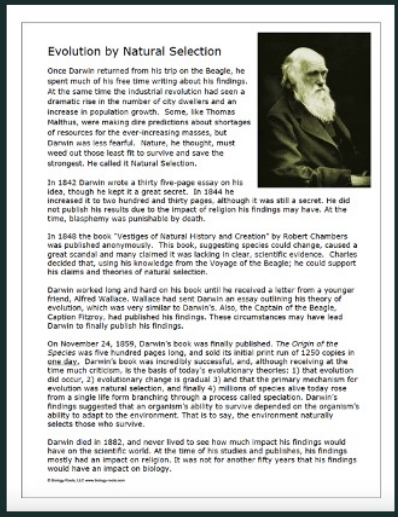
evolution Unit Plan

GRADES 8 + COMPLETE UNIT

TOPICS:

- ✓ Brief history of evolutionary thought
- ✓ Darwin's observations
- ✓ Theory of Natural Selection
- ✓ Mechanisms of evolution
- ✓ Evidence for evolution



Evolution by Natural Selection

Once Darwin returned from his trip on the Beagle, he spent much of his free time writing about his findings. At the same time the industrial revolution had seen a dramatic rise in the number of city dwellers and an increase in population growth. Some, like Thomas Malthus, were making dire predictions about shortages of resources for the ever-increasing masses, but Darwin was less fearful. Nature, he thought, must weed out those least fit to survive and save the strongest. He called it Natural Selection.

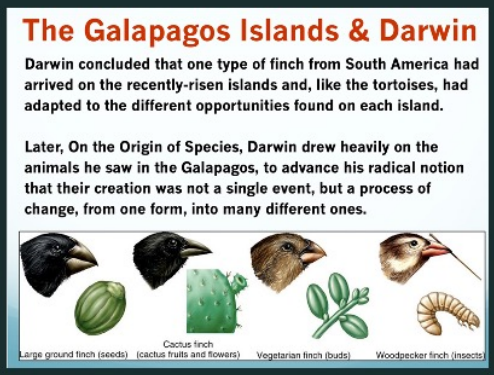
In 1842 Darwin wrote a thirty five-page essay on his idea, though he kept it a great secret. In 1844 he increased it to two hundred and thirty pages, although it was still a secret. He did not publish his results due to the impact of religion his findings may have. At the time, blasphemy was punishable by death.

In 1848 the book "Vestiges of Natural History and Creation" by Robert Chambers was published anonymously. This book, suggesting species could change, caused a great scandal and many claimed it was lacking in clear, scientific evidence. Charles decided that, using his knowledge from the Voyage of the Beagle; he could support his claims and theories of natural selection.

Darwin worked long and hard on his book until he received a letter from a younger friend, Alfred Wallace. Wallace had sent Darwin an essay outlining his theory of evolution, which was very similar to Darwin's. Also, the Captain of the Beagle, Caption Fitzroy, had published his findings. These circumstances may have lead Darwin to finally publish his findings.

On November 24, 1859, Darwin's book was finally published. *The Origin of the Species* was five hundred pages long, and sold its initial print run of 1250 copies in one day. Darwin's book was incredibly successful, and, although receiving at the time much criticism, is the basis of today's evolutionary theories: 1) that evolution did occur, 2) evolutionary change is gradual 3) and that the primary mechanism for evolution was natural selection, and finally 4) millions of species alive today rose from a single life form branching through a process called speciation. Darwin's findings suggested that an organism's ability to survive depended on the organism's ability to adapt to the environment. That is to say, the environment naturally selects those who survive.

Darwin died in 1882, and never lived to see how much impact his findings would have on the scientific world. At the time of his studies and publishes, his findings mostly had an impact on religion. It was not for another fifty years that his findings would have an impact on biology.



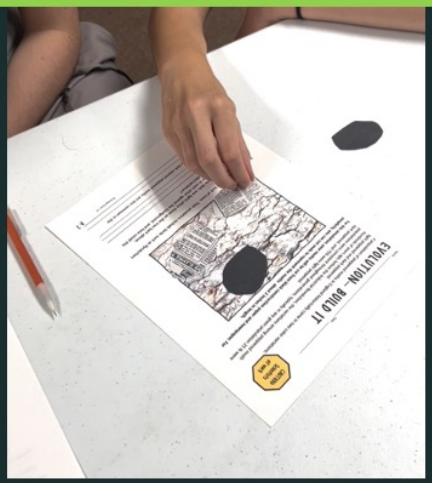
The Galapagos Islands & Darwin

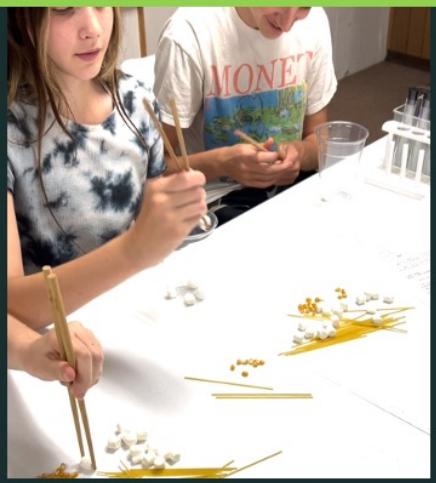
Darwin concluded that one type of finch from South America had arrived on the recently-risen islands and, like the tortoises, had adapted to the different opportunities found on each island.

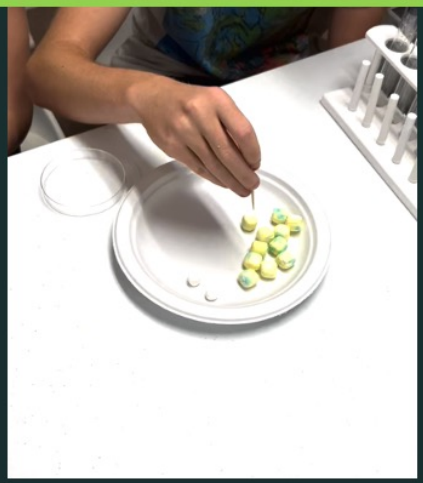
Later, On the Origin of Species, Darwin drew heavily on the animals he saw in the Galapagos, to advance his radical notion that their creation was not a single event, but a process of change, from one form, into many different ones.

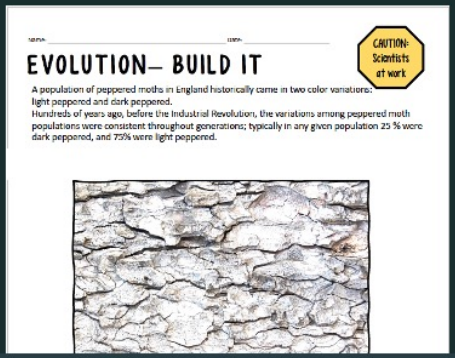
biology roots

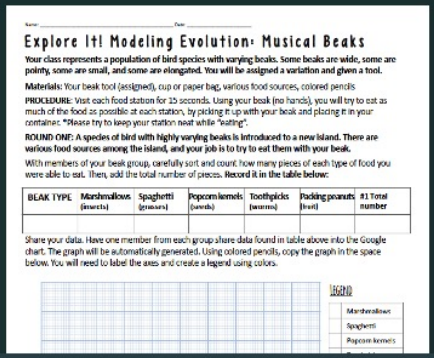
Evolution ATLAS Activities (optional)
Analyzing and Thinking Like A Scientist
Includes guided inquiry, models, and case studies.

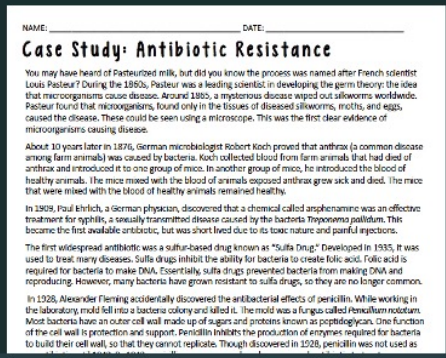








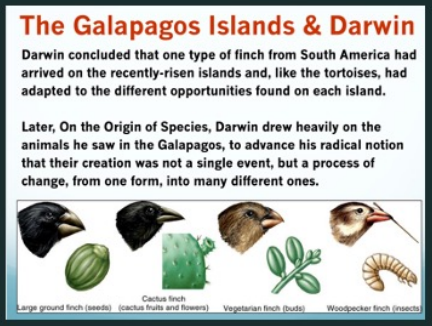


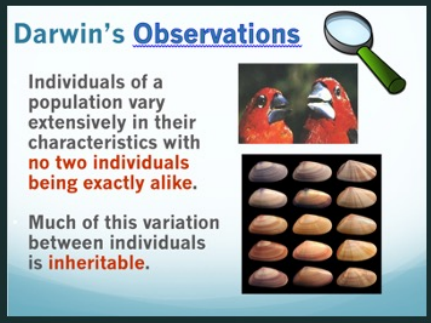


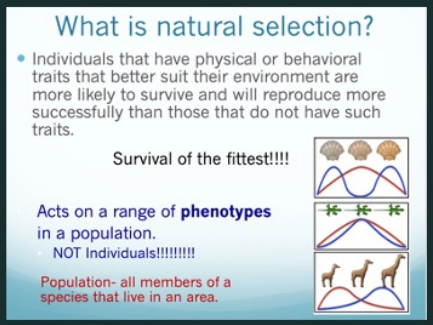
Can be used in one of two ways:

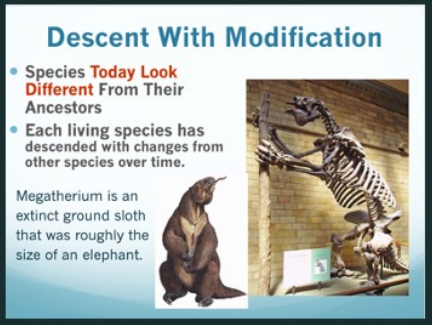
1. As student-lead guided inquiry done in groups before teacher-lead instruction.
2. Or you can choose what you would like to use during traditional teacher-lead instruction.

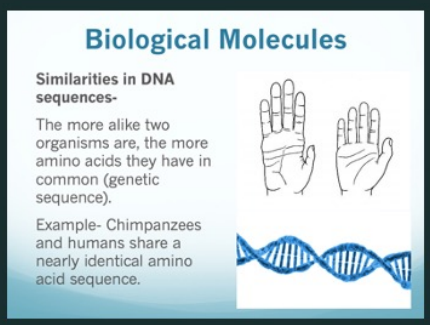
Engaging, editable PowerPoint includes the history of evolutionary thought, Darwin's observations, natural selection; and evidence for evolution.

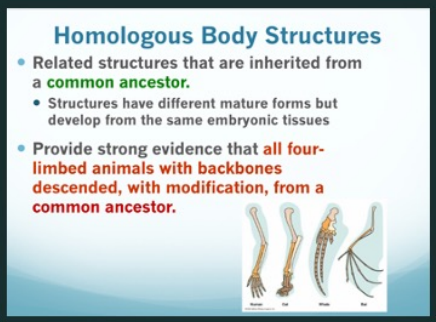




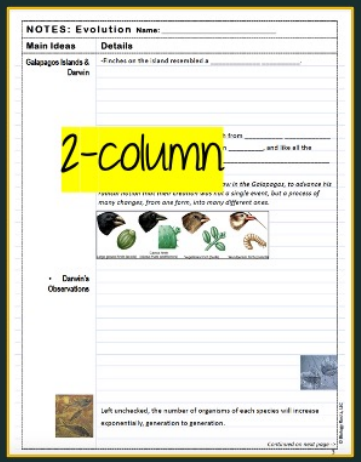






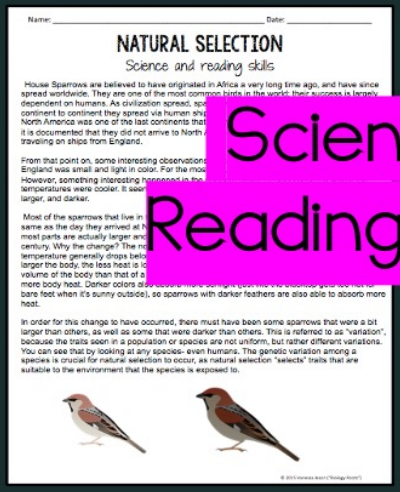






Two types of student notes to choose from: fill-in-the-blank OR guided 2-column. Choose what works best for you!

Classwork


Name: _____ Date: _____

NATURAL SELECTION

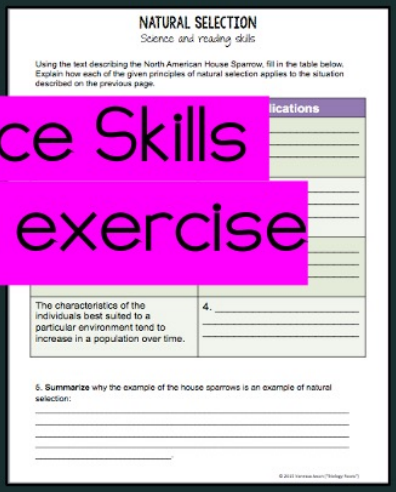
Science and reading skills

House Sparrows are believed to have originated in Africa a very long time ago, and have since spread worldwide. They are one of the most common birds in the world; their success is largely dependent on humans. As civilization spread, sp… continent to continent they spread via human ship… North America was one of the last continents that… it is documented that they did not arrive to North A… traveling on ships from England.

From that point on, some interesting observations… England was small and light in color. For the mos… However, something interesting happened in the… temperatures were cooler. It seem… larger, and darker.

Most of the sparrows that live in… same as the day they arrived at h… most parts are actually larger and… century. Why the change? The mi… temperature generally drops belo… larger the body, the less heat is lo… volume of the body than that of a… more body heat. Darker colors also absorb more sunlight (think of how hot you feel in black clothing on a bare feet when it's sunny outside), so sparrows with darker feathers are also able to absorb more heat.

In order for this change to have occurred, there must have been some sparrows that were a bit larger than others, as well as some that were darker than others. This is referred to as "variation", because the traits seen in a population or species are not uniform, but rather different variations. You can see that by looking at any species- even humans. The genetic variation among a species is crucial for natural selection to occur, as natural selection "selects" traits that are suitable to the environment that the species is exposed to.

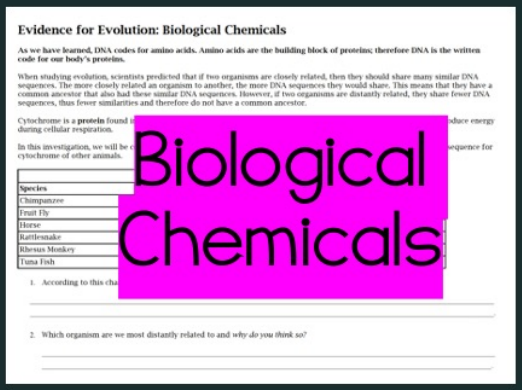

NATURAL SELECTION

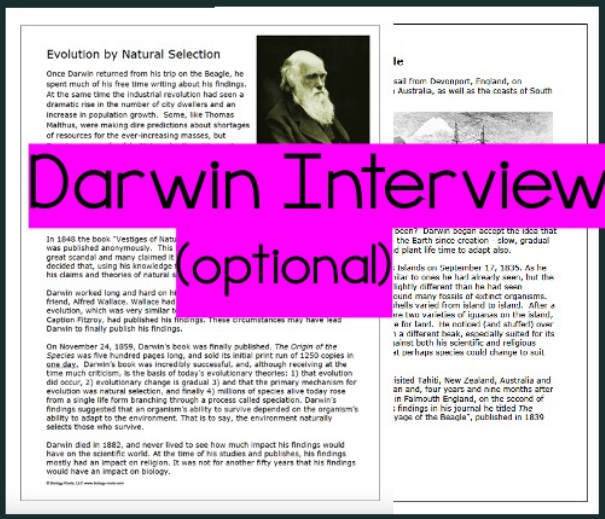
Science and reading skills

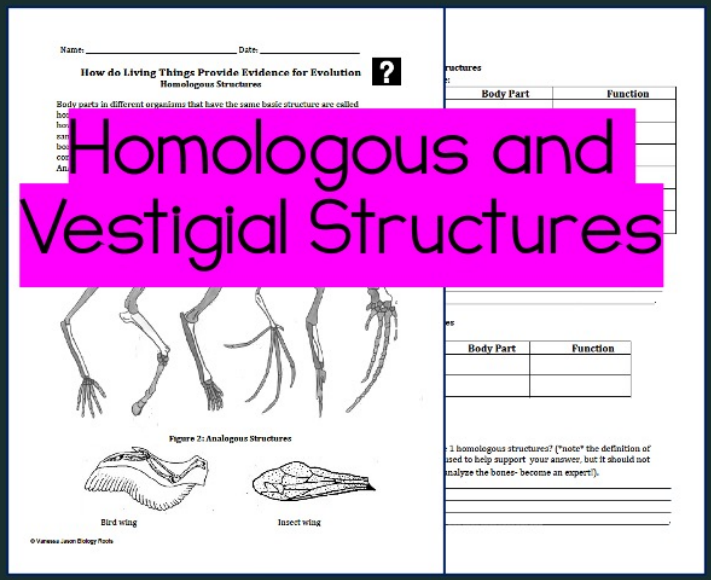
Using the text describing the North American House Sparrow, fill in the table below. Explain how each of the given principles of natural selection applies to the situation described on the previous page.

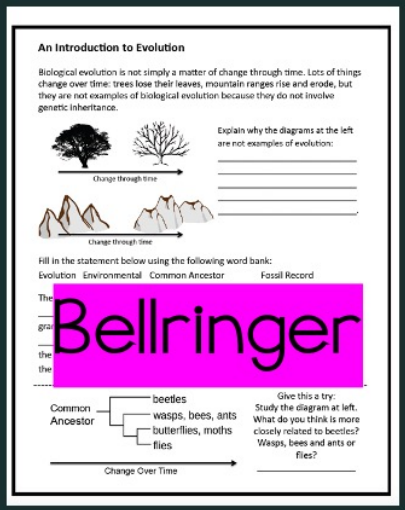
	lications

Classwork





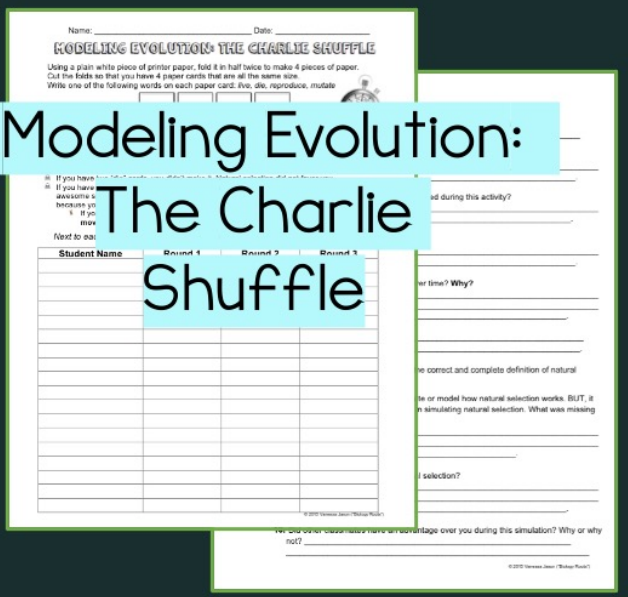


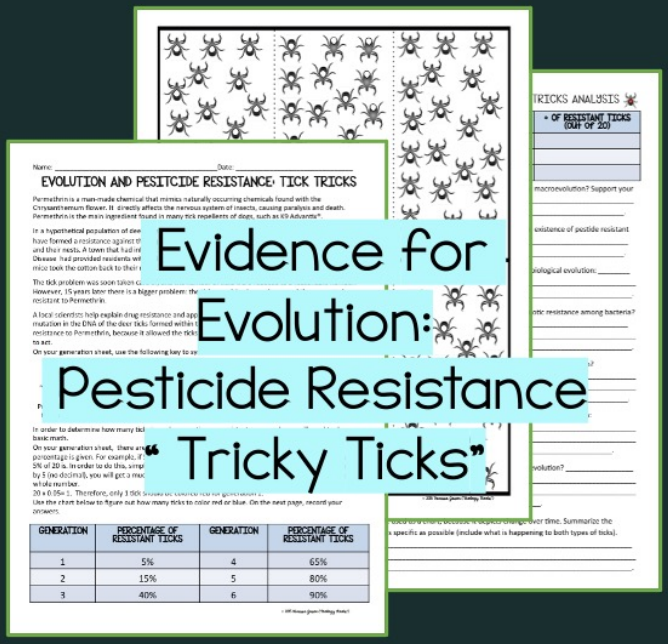


Can be used as classwork or homework

Lab simulations and models







Evolution Task Cards Stations

STATION 2

Evolution can be loosely described as change through time. Over time, rivers may change their shape due to the erosion of the flowing water and sediment it pulls with it. Explain why this is NOT an example of evolution.

STATION 20

How has DNA changed our idea of evolution? Has it helped us further unde theory of natural selection?



STATION 5

The rough skinned newt is one of the most toxic animals on the planet. It produces enough toxin to kill multiple grown humans in an instant.
The newt has become increasingly toxic over time due to an "evolutionary arms race" against its main predator, the garter snake. Offer an explanation as to how the garter snake is affecting the toxicity of the rough the skinned ne

STATION 9

hat are vestigial structures
y do scientists consider th
when studying evolution?

Name: _____ Date: _____

EVOLUTION AND NATURAL SELECTION

Station 1- Natural selection is...

Station 2- Changing rivers are not an example of evolution because _____

Station 3- How can ***individuals*** play a role in the evolution of an ***entire species***?

Station 4- Subspecies are _____

Example of how or why a subspecies may form: _____

Station 5- How can the **genetic variation** among species be an advantage or a disadvantage for the individual?

Station 6- How is the garter snake causing the rough-skinned to newt to become more toxic? How is the garter snake surviving this increased toxicity generation after generation?

Station 7- EVOLUTION- _____

How are evolution and natural selection related? _____

Station 8- Homologous structures

Station 9- Vestigial structures are _____

Name: _____ Date: _____

EVOLUTION AND NATURAL SELECTION

Station 1- Natural selection is...

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Example of how or why a subspecies may form: _____

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Station 7- EVOLUTION- _____

How are evolution and natural selection related? _____

Station 8- Homologous structures

Station 9- Vestigial structures are

Student recording sheet

Station 10- How is the **Fossil record** used as evidence for evolution? _____

Station 11- Factors of Natural Selection
- Genetic variation among species
- _____
- _____

Station 12- How did **Thomas Malthus** influence Darwin?

Station 13- Who was **Jean Baptiste Lamarck**

How did he influence Darwin? _____

Station 14- GENETIC DIVERSITY IS REQUIRED FOR THE SURVIVAL OF A SPECIES

Station 15- Macroevolution vs. Microevolution
What is the difference between the two forms of evolution?

Example of macroevolution:

Example of microevolution:

Station 16- Embryonic Development
How can we use embryology as evidence for evolution?

Station 17- Why does the population of blue mussels have thicker shells than they did prior to the invasion of the Asian shore crab?

Station 18- The accumulation of differences that can lead to a new species is called _____
Offer an **explanation** as to why this may occur: _____

Station 19- What role does Darwin's theory play in modern evolution?

Station 20- How has DNA helped us to further understand natural selection?

Station 21- What is an **adaptation**? _____
Provide an example of an adaptation found in a species of your choice: _____

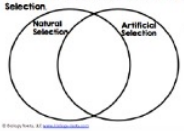
Station 22- Darwin's Finches
How did the finches of South America play a role in Darwin's theory of natural selection?

Station 23- Genes and Natural Selection
How does natural selection affect the alleles of a population? _____

Does natural selection act up phenotypes or genotypes? _____
Explain: _____

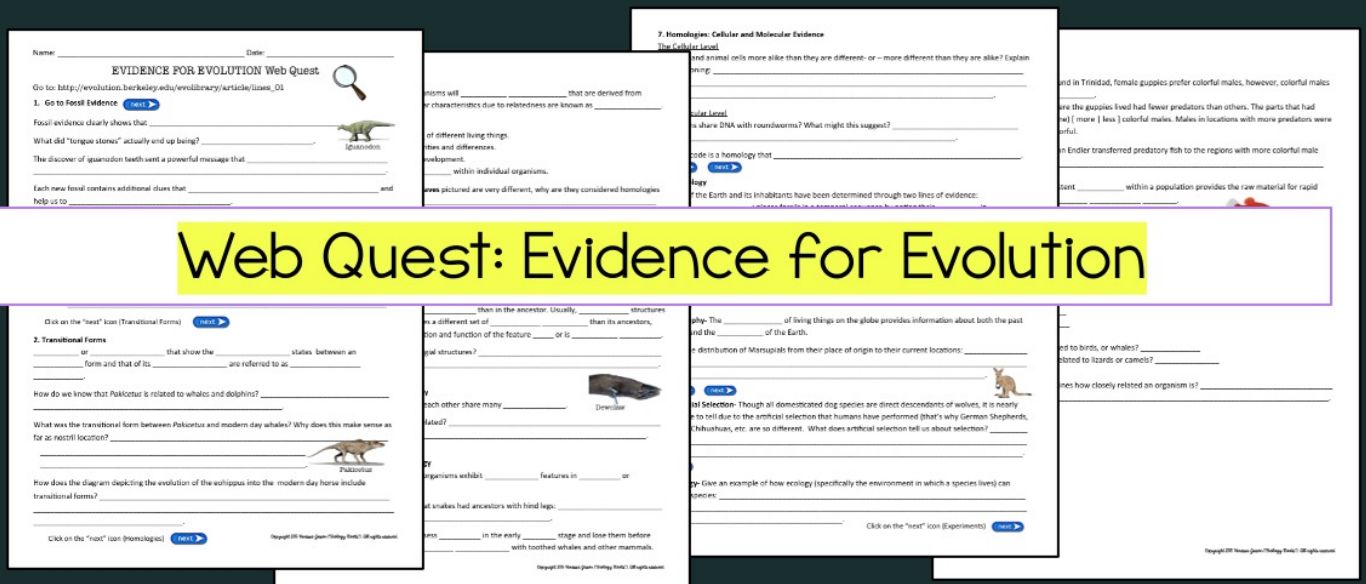
Station 24- Galapagos Islands

Station 25- Natural Selection vs. Artificial Selection

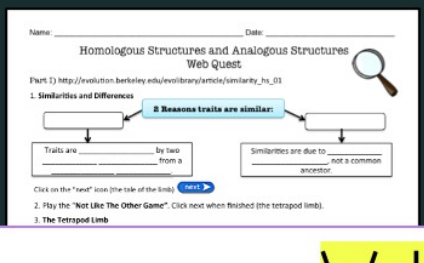


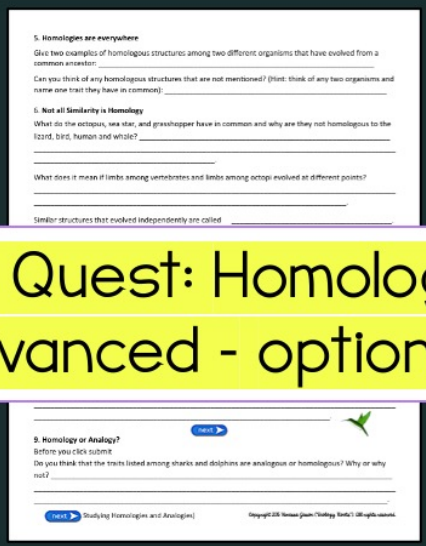


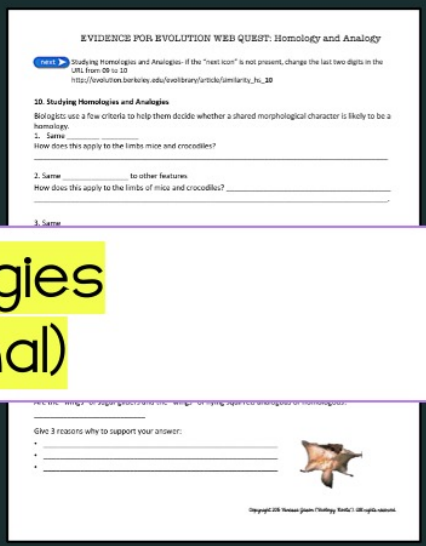
Internet Lessons Web Quests



Web Quest: Evidence for Evolution

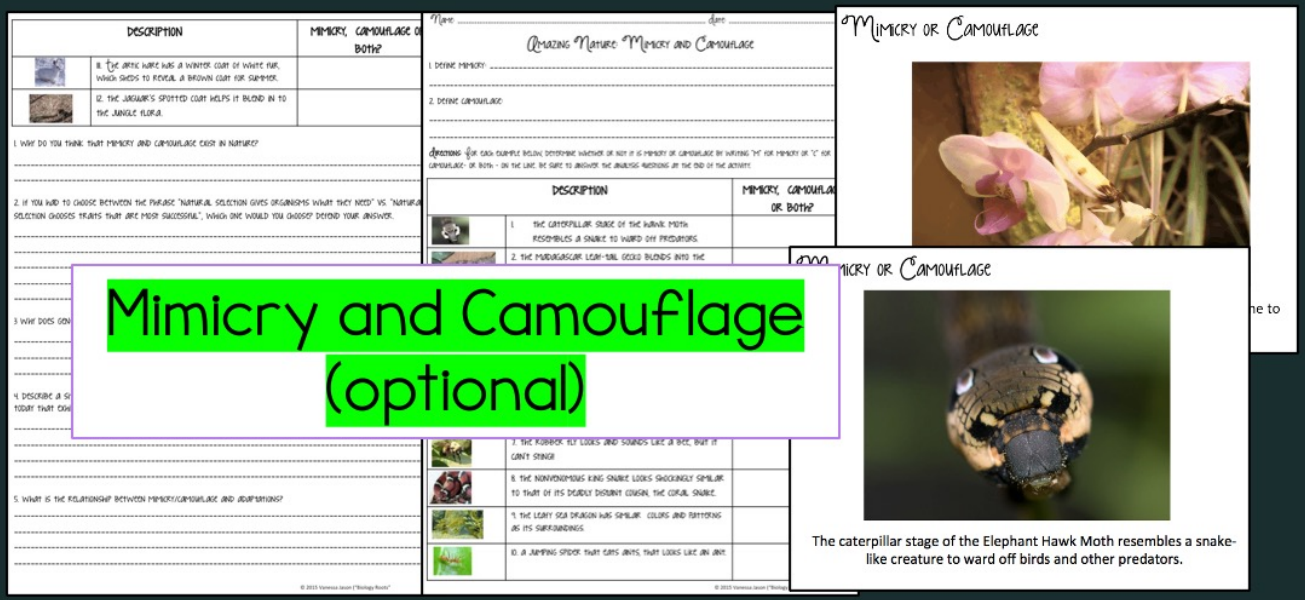




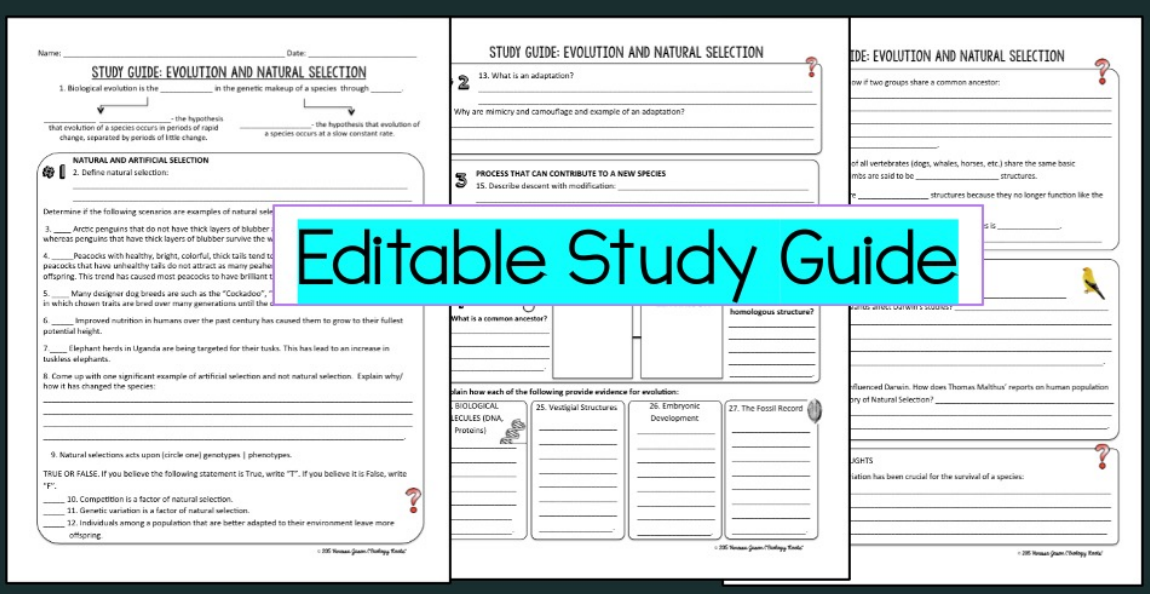


Web Quest: Homologies (advanced - optional)

...Plus more



Mimicry and Camouflage (optional)



Editable Study Guide

Test and quiz also included (not pictured)

EVOLUTION UNIT BUNDLE ~50 minute blocks		
Day/Date	STUDENT Activity and teacher notes	Learning TARGET
(before)	ATLAS Journal is optional. See teacher guide in folder for more information and learning targets.	
1 _____	Begin Evolution Notes- up through History of Evolutionary Thought (stop at Charles Darwin) *Assign Darwin's for interview (see instructions- you may skip this activity and show a video instead) Theory of Evolution (homework if not finished).	To introduce precursors of Darwin to shape evolutionary thought and avoid misconceptions.
2 _____	Notes up through Darwin's conclusions Darwin Interview (if you'd like to skip this you may show a video instead such as this one: https://www.youtube.com/watch?v=dfsUz2O2jww) If time, review Theory of Evolution (if not, review next class)	To explore Darwin's findings that led to his theory of natural selection Goal: students will be prepared to interpret Darwin's theory of natural selection.
3 _____	Notes up through Natural Selection (stop at Origin of Species slide) Natural Selection Science and Reading Skills (homework if not finished).	To describe natural selection as the driving force of evolution. Goal: students will be able to define natural selection.
4 _____	Lab: The Charlie Shuffle (questions make a great discussion!) Optional: Mimicry and Camouflage (if you'd like to skip, just bump everything up one day; finish the notes instead and assign Evolution of Birds for homework- you may need more time to finish the notes next class, no problem.) Heads up! *Quiz coming up	To apply Darwin's findings to his theory and to simulate the mechanism of evolution via natural selection. Goal: students will be able to explain natural selection and relate how genes play a role. *Optional activity: to explore adaptations
5 _____	Finish Notes Evolution of Birds (homework if not finished)	To explore evidences for evolution. Goal: students will be able to identify biomolecules, homologous structures, embryonic dev., and examples of microevolution as evidence for evolution.
6 _____	Evolution Bellringer Pesticide Resistance: Tricky Ticks Evidence for Evolution: Biomolecules *Note: Laptops or devices next class*	To model natural selection using real-life scenarios. Goal: students will be able to interpret, explain and identify natural selection.
7 _____	Evidence: Structure Lab- Homologous and Vestigial Evidence for Evolution Web Quest: Homologies and Analogies web quest (time given next class to finish after quiz.) Heads up! *Quiz next class! *Note: Laptops or devices next one or two classes*	To classify homologous and analogous structures; to analyze homologous structures and their relationships. Goal: students will have an understanding how homologous structures provide evidence of evolution.

A pacing guide with learning targets is provided to guide you with lesson planning throughout the entire unit.

Includes both 50 and 90 minute blocks.

Covers both learning targets and learning goals.
Adaptable - use it as is, or make your own!

More information:

Digital versions are hosted on Google Slides.

Supports NGSS (ATLAS activities particularly).

Tests and quizzes included (not pictured).

AC

Alex C.

Apr 22, 2024

★★★★★ **Extremely satisfied**

This resource has been an absolute game-changer in my classroom. It's well-organized, engaging, and aligns perfectly with my curriculum. The materials are visually appealing, making learning fun for my students. The clear instructions and variety of activities cater to different learning styles, ensuring that all my students are actively involved. Overall, this resource has truly enhanced my teaching experience, and I highly recommend it to fellow educators!

Still not sure if you need this resource?

This unit is for any teacher who is looking for a truly no-prep evolution unit from start to finish, or simply a large bank of evolution activities to use in the classroom! If your school is using an online curriculum (such as OpenSciEd) and you are finding that you need to supplement to reach your learners, my unit bundles are compatible and help prevent student burn out - because I know what sparks students! Reach out with questions ☺

-Vanessa vanessa@biology-roots.com

Supports the following TEKS:

B.7(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

B.7(B) examine scientific explanations of abrupt appearance and stasis in the fossil record

B.7(C) analyze and evaluate how natural selection produces change in populations, not individuals B.7(D) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success

B.7(E) analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species

B.7(F) analyze other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination

Supports the following NGSS performance expectations:

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence, including molecular, anatomical, and developmental similarities inherited from a common ancestor (homologies), seen through fossils and laboratory and field observations.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. Emphasis is on using evidence to explain the influence each of the four factors has on number of organisms, behaviors, morphology, or physiology in terms of ability to compete for limited resources and subsequent survival of individuals and adaptation of species. Examples of evidence could include mathematical models such as simple distribution graphs and proportional reasoning. Assessment does not include other mechanisms of evolution, such as genetic drift, gene flow through migration, and co-evolution.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts as evidence to support explanations. Assessment is limited to basic statistical and graphical analysis. Assessment does not include allele frequency calculations.

NGSSHS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations. Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, long-term climate change, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations.

HS-LS4-5. Evaluate models that demonstrate how changes in an environment may result in the evolution of a population of a given species, the emergence of new species over generations, or the extinction of other species due to the processes of genetic drift, gene flow, mutation, and natural selection.