

Darwin's theory of evolution analysis flashcard



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What was Charles Darwin's contribution to Science? Darwin developed a scientific theory of biological evolution that explains how modern organisms evolved over long periods of time through descent from common ancestors.

Darwin shares a birthday with what American President. Abraham Lincoln. They both were born on February 12, 1809.

What is evolution? Evolution is the process of change over time.

Why Darwin's theory important? Darwin's work shows how the living world is constantly changing, which helps us understand things like drug-resistant bacteria and newly emerging diseases.

When did Darwin's trip on the HMS Beagle begin and how long was it?

Darwin's journey began in 1831 and was a 5 year trip from Western Europe to South America, New Zealand, around the Cape of Good Hope in southern Africa and back to Europe.

What three patterns of biodiversity did Darwin note?(1) Species vary globally, (2) Species vary locally, and (3) Species vary over time.

What pattern did Darwin observe in the rhea that live only in South America and the emu that only live in Australia? The rhea and the emu are flightless birds that look like ostriches. Darwin noticed that species vary globally.

What did Darwin mean by "species vary globally?" Darwin meant that different, yet ecologically similar, animal species inhabited separate, but ecologically similar, habitats around the globe.

What did Darwin mean by "species vary locally?" He meant that different, yet related, animal species often occupied different habitats within a local area.

How does the shell shape of the tortoise on the Galapagos island demonstrate that species vary locally? The turtles from Isabela Island have dome-shaped shells and short necks, because the vegetation on the island is close to the ground.

The turtles of Hood Island are curved and open around their long necks and legs, which allows them to reach the Island's sparse, high vegetation.

What is biogeography? Biogeography is the study of where organisms live now and where they and their ancestors lived in the past.

What biogeographical patterns are significant to Darwin's theory? First, a pattern in which closely related species differentiate in slightly different climates (e. g., the shell shape of different tortoises). Second, a pattern in which very distantly related species develop similarities in similar environments (e. g., rheas, ostriches, and emus),

What did Darwin observe about the fossils he collected and what did it lead him to conclude? Darwin noticed that some fossils didn't look anything like living organisms, but some fossils of extinct animals were similar to living species. It lead him to conclude that species vary over time.

What are homologous structures? Structures that are shared by related species and that have been inherited from a common ancestor. For example,

the front limbs of reptiles and birds are more similar to each other than either is to the front limb of an amphibian or mammal.

How do biologists test for homologous structures? Biologists test whether structures are homologous by studying anatomical details, the way structures develop in embryos, and the pattern in which they appeared over evolutionary history.

What are analogous structures? Body parts that share a common function, but not structure, are called analogous structures. The wing of a bee and the wing of a bird are analogous structures.

What are vestigial structures? Vestigial structures are inherited from ancestors, but have lost much or all of their original function due to different selection pressures acting on the descendant. The hipbones of bottlenose dolphins are vestigial structures. In their ancestors, hipbones played a role in terrestrial locomotion. However, as the dolphin lineage adapted to life at sea, this function was lost.

What were the other ideas that were being developed during Darwin's time? Geologists were studying the structure and history of the Earth, and suggesting that Earth had changed over time.

Naturalists were investigating connections between organisms and their environment.

Biologists also were suggesting that life on Earth had changed.

What did Hutton and Lyell conclude about Earth's history? Hutton and Lyell concluded that Earth is extremely old and that the processes that changed Earth in the past are the same processes that operate in the present.

What concept did Hutton introduce? Hutton introduced the concept of deep time — the idea that our planet's history stretches back over a period of time so long that it is difficult for the human mind to imagine.

What is Lyell's principal of uniformitarianism? Lyell believed that the geological processes we see in action today must be the same ones that shaped Earth millions of years ago.

How do Hutton's and Lyell's principles explain the Grand Canyon? The rock layers in the Grand Canyon were laid down over millions of years and were then slowly washed away by the river forming a channel.

Was Darwin the first scientist to suggest that characteristics of species could change over time? No. Jean-Baptist Lamarck, a French naturalist, proposed two hypotheses on the subject during the 18th century.

What were Lamarck's two hypotheses? First, that organisms could change during their lifetimes by selectively using or not using various parts of their bodies.

Second, that individuals could pass these acquired traits on to their offspring, enabling species to change over time.

What are acquired characteristics? Traits altered by an individual organisms during its life. For example, a black-necked stilt could have acquired long

legs because it began to wade in deeper water looking for food. As the bird tried to stay above the water's surface, its legs would grow a little longer.

How did Lamarck explain “inheritance of acquired characteristics?” He believed that all organisms have an inborn urge to become more complex and perfect.

As a result, organisms change and acquire features that help them live more successfully in their environment, and then pass the acquired traits to their offspring.

Why were Lamarck's hypotheses incorrect? First, organisms do not have an inborn drive to become perfect. Evolution does not mean that over time the species becomes better.

Second, traits acquired by individuals during their lifetime cannot be passed on to offspring.

What did Lamarck get right? He recognized that there was a link between an organism's environment and its body structures.

Why are Lamarck's ideas called scientific hypotheses and not scientific theories? An hypothesis is a possible explanation for a set of observations or possible answer to a scientific question.

A theory is a well-tested explanation that unifies a broad range of observations and hypotheses.

What was Malthus' view on population growth? Malthus noted that humans were being born faster than people were dying. He reasoned that if the

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human population wasn't balanced, there would not be enough living space and food for everyone.

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What is artificial selection? In artificial selection, nature provides variations and humans select those they find useful.

How did Darwin use artificial selection to explain his theory? He studied changes produced by plant and animal breeders. He concluded that some of the variations could be passed from parents to offspring and used to improve the species.

How did scientists view variations in animals before Darwin's theory? Before Darwin, scientists thought variations among individuals in nature were simply minor defects.

Why was Darwin's recognition about natural variations important? Because it provided the raw material evolution, even though he had no idea how heredity worked or what caused heritable variation.

What was Darwin's book called? The Origin of Species. In it, he combined his own thoughts with ideas from Malthus and Lamarck.

What is the struggle for existence? Darwin's view that if more individuals are produced than can survive, members of a population must compete for food, shelter and other limited necessities of life.

What role does variation and adaptation play? Darwin hypothesized that some traits are better suited to life in their environments than others. Thus, only the stronger/faster survive.

What is an adaptation? Any heritable characteristic that increases an organism's ability to survive and reproduce in its environment.

What is survival of the fittest? Survival of the fittest means the organism's ability to stay alive as well as to reproduce and pass adaptations on to the next generation.

What does it mean to say an organism has a low fitness? The individual's characteristics are not well suited to their environment, so they die without reproducing or they leave few offspring.

What is mimicry? Mimicry is an adaptation in which an organism copies or mimics a more dangerous organism, such as the scarlet king snake that mimics the poisonous eastern coral snake.

What is camouflage? Camouflage is an adaptation that allows an organism to blend into the background and avoid predators (for example, a grasshopper's green coloring).

Why did Darwin name his mechanism for evolution "natural selection?"
Because of its similarities to artificial selection. It is the process by which

organisms with variations most suited to their local environment survive and leave more offspring.

What is the difference between natural selection and artificial selection? In natural selection the environment, rather than a farmer or animal breeder, influences fitness.

Why does natural selection only acted on inherited traits? Because those are the only characteristics that parents can pass on to their offspring.

How does natural selection explain the extinction of a species? If local environmental conditions change faster than a species can adapt to those changes, then the species may become extinct.

What is "descent with modification?" Darwin proposed that living species are descended from common ancestors. He drew a tree, we call "the single tree of life" to illustrate this point.

How does the proof of the Bush cricket's ability to make music relate to Darwin's theory of natural selection? The sound that the cricket makes is intended to advertise their presence and reproductive quality to their potential mates. The study of the Bush cricket shows that crickets had developed this adaptation over 100 million years ago, which is consistent with Hutton and Lyell's contribution to Darwin's theory: Deep time gave enough time for natural selection to act. The fact that the Bush cricket is extinct, however, probably means that as the environment changed the Bush cricket did not adapt to other factors that would have allowed it to survive and reproduce, including that its sounds may have been too weak in a

habitat that had more, larger and louder animals. It went from a higher fitness level to a low fitness level.

Olivia: Ms. Colfax will ask you to identify the cartoon or diagram that corresponds with a specific scientist's concept. For example, she may show you Darwin's sketch of the " tree of life," and expect you to relate it to his theory that everyone descends from a common ancestry. If you can, go on to Moodle and review the slide presentation, Darwin_Theory_Evidence_evolution, but specifically slides 8 -12, and slides 28 - 31. Ask yourself, " What principle is this showing?" Also, Google Darwin's " tree of life" so that you remember what it looks like.