

Early Theories of Evolution

For centuries it was assumed that the earth was relatively young. In fact, in 1650 Archbishop James Ussher of Armagh used biblical references to deduce that the earth was created on _____ (a Sunday). Most people of his generation believed that the earth and all life on it were _____ (unchanging).

By the 19th century, geologists like _____ and _____ were finding evidence that the earth was much older than a few thousand years (closer to billions of years old). They observed that _____, like erosion and the formation of mountains, are extremely slow. For example, Lyell estimated that based on its rate of erosion Niagara falls existed for _____ years. This suggested that the earth was very _____ and _____ over time.

<http://www.kcl.ac.uk/depsta/iss/archives/london/image/going/lyell.jpg>



Sir Charles Lyell

Sir Charles Lyell expressed these ideas in his principle of uniformitarianism.

Fossil evidence of plants and animals that no longer exist pointed to the fact that living things _____ over time. Naturalists like _____ and Erasmus Darwin (_____) provided the first hypotheses regarding this change. Erasmus Darwin argued that all life had developed from a _____ source and that humans were most closely related to other _____.

If living things did change over time, the next problem was to figure out _____ this change occurred. In 1809, Jean Baptiste _____ was the first to suggest that the _____ plays a role in this change. Lamarck's theories of use and disuse and

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inheritance of acquired traits, proposed that adaptations to environmental conditions made by an _____ in its _____, could be passed on to its offspring.

Lamarck's Hypothesis:

Due to a change in the environment (_____), giraffes could not reach their food. Giraffes were forced to stretch their neck in order to reach food (theory of use and disuse). If the environment continued to change, the giraffe would continue to adapt to this change by _____ further.

Summary:

Supporting Evidence:

None. Lamarck didn't know it, but genetic traits are passed on through our _____ only. Changes to our _____ cells do not get passed on.

From 1831-1836, Charles Darwin worked as a _____ on the H.M.S. Beagle studying life on the coastline of S. America and the islands of the Pacific Ocean. Darwin observed that living things show a great _____ in morphology. He reasoned, like Lamarck, that the _____ was the cause, but the mechanism that Darwin proposed was different.

Darwin's theory was largely built on the work of Charles Lyell (the earth is very old) and an economist named _____

<http://www.educarm.es/paleontologia/imagenes/lamarck.jpg>



Thomas Malthus

Malthus noted that people tend to reproduce at a rate _____ than their available resources. As a result not everyone will survive. There will be a _____.

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Darwin realized that this over reproduction happens in all living things. Since there is _____ in the genetics of individuals, some will have traits that allow them to survive in their _____, while other will not. The survivors will be able to _____ and therefore pass their traits on to the next generation. In other words there is _____ survival and reproduction.

Darwin spent the next _____ years compiling evidence for his theory. In 1858, Alfred _____ independently arrived at the same conclusion as Darwin. They wrote a paper together describing the theory of _____.

Darwin/Wallace Hypothesis:

There is variation in the _____ of the giraffe population. When there is a change in the environment (_____), some of the giraffes are better able to survive and reproduce than others. Those giraffes that survive pass their “tall” traits on to their offspring, so the _____ would be taller on average in the next generation. If the environment continued to change, the giraffes in the population that have the longer necks will continue to survive and reproduce at a greater rate than others. The _____ neck length in the population will increase.

Summary:

For any trait there is _____ in the population. When environmental conditions change, individuals that possess the _____ trait enjoy differential _____ and _____. In the next generation this trait becomes more _____ in the population.

Supporting Evidence:

The Fossil Record

Artificial Selection

Comparative Anatomy

Coevolution

Evolution in Action Now