Evolution Timeline

James Hutton (c. 1785)

Hutton proposes a detailed hypothesis about the geological forces that have shaped the Earth over a long period of time. He suggests that layers of rocks form slowly and that some are pushed up from the sea floor to form mountain ranges. He estimates that the Earth is millions, not thousands, of years old.

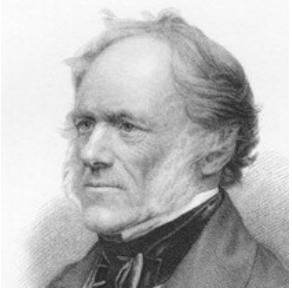
Thomas Malthus (c. 1798)

The economist Malthus, who was also an important influence on Darwin, predicts that the human population will grow faster than the space and food supplies needed to sustain it. He realized that babies were being born faster than people were dying. Darwin took this a step further and applied it to plants and other animals. Obviously, the world is not overrun with trees, squirrels or fish, so what factors determine which ones survive and reproduce? This is what Darwin wanted to answer.

Jean-Baptiste Lamarck (c. 1809)

French naturalist Jean-Baptiste de Lamarck proposes that living things evolve to become more complex through time. Acquired traits, which are developed through use or disuse, are then passed on to future generations. Lamarck thought wading birds evolved long legs as they stretched to keep high and dry. Even though his ideas are flawed, he is the first one to propose a mechanism explaining how organisms change over time.

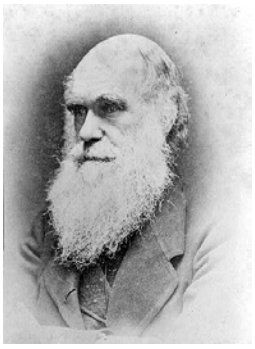
Charles Lyell (c.1830)



Charles Lyell's theory, known as uniformitarianism, proposes that that slow-moving, gradual processes explain Earth's geology. He echoes his mentor, James Hutton, who wrote that Earth's history has "No vestige of a beginning. No prospect of an end." And Lyell becomes a mentor to Darwin himself. Darwin later applies Lyell's notion of gradual change to his theory of how species evolve.

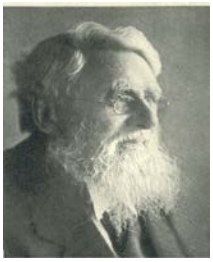
Evolution Timeline

Charles Darwin (c. 1831)



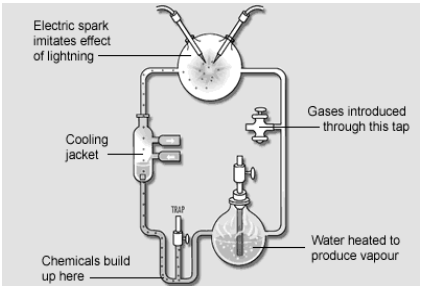
When Darwin begins his voyage on the H.M.S. Beagle, he intends to spend his life in the clergy. But five years later, after what was intended to be a 2 year trip, he is a changed man and is now committed to a life of science. The collection he returns with, particularly fossils from South America and creatures from the Galapagos Islands, becomes the basis of his budding ideas about evolution. His Galapagos birds, in particular, seem to point out that new species can evolve over time from a common ancestor. In 1859, he published the results of his work in his book *On the Origin of Species.* He proposed a mechanism for evolution that he called natural selection.

Alfred Wallace (c. 1858)



Alfred Wallace, a young British explorer, writes Darwin from Malaysia, seeking the older naturalist's advice. Wallace has a theory of how species might evolve. Darwin is shocked because Wallace has struck upon the theory of natural selection that Darwin has been researching for over 20 years. Darwin now had an incentive to publish his work. Without his prompting or competition, Darwin might never have published in his lifetime.

Stanley Miller and Harold Urey (c. 1953)



By the 1950's scientists were in hot pursuit of the "origins of life". Miller and Urey, both chemists at the University of Chicago, tried to answer this question by simulating conditions thought to be present at the time of early Earth. In their experiment, they passed sparks, simulating lightning, through a mixture of hydrogen, methane, ammonia and water which simulated the atmosphere. Their experiment suggested that organic compounds such as amino acids, which are essential to cellular life, could have arisen from simpler compounds present on a primitive Earth.

Lynn Margulis (c. 1970)

Margulis, a professor at the University of Massachusetts, proposes an idea that certain organelles were once free-living cells. She based her argument on the fact that mitochondria and chloroplasts have intriguing similarities in structure, mode of reproduction, and genetic makeup to certain bacteria. She also made contributions to the endosymbiotic theory, which proposes that mitochondria and chloroplasts were once prokaryotic cells that lived inside larger host cells and eventually evolved into eukaryotic cells over millions of years.