**Origins 101-5**

**Darwinism & Neo-Darwinism**

Script

Instructions: Advance the PowerPoint slides at every new paragraph and anywhere you see “/”

[1] Origins 101: / Darwinism and Neo-Darwinism. The purpose of this presentation is to describe the claims of Darwinism and how they have been modified through the years. **Remember, though, that when we describe the theory, we aren’t presenting its claims as truth.**

[2] In 1859 Charles Darwin published his book, On the Origin of Species by Means of Natural Selection. In time it became one of the most influential books ever written.

[3] Many of the ideas in the book were not new. / Influenced by many other scientists, including his grandfather, Erasmus Darwin, Charles organized ideas already present in the scientific community into a coherent theory.

[4] Darwin’s theory had two main claims:

* The Theory of Universal Common Descent and
* Natural Selection

[5] The theory of universal common descent states that every creature descended from a single-celled common ancestor somewhere in the distant past. Although the idea of common ancestry had been discussed by others before…

[6] …Darwin was the first to put it together with a mechanism to explain the evolutionary process. / The mechanism he suggested was natural selection, which included four parts:

* Overproduction refers to the idea that more creatures are born than can survive on the available resources.
* There is variation in any population of living creatures.
* Some traits, or adaptations, increase an organism’s fitness (This means the traits enable an organism to survive and reproduce better than others.)
* Traits that increase an organism’s fitness are passed on to their offspring, replacing traits that do not and changing populations over time.

[7] Essentially Darwin believed that evolution is gradual. Small changes, acted on by natural selection, accumulate over long periods of time. / It is important to realize that natural selection happens to individual creatures, / but evolution happens gradually to populations over time.

[8] According to Darwinism, small evolutionary changes within populations over millions of years add up to major change. / In other words, the theory claims that lots of microevolution over lots of time equals macroevolution. / Throughout Origins 101, we will explore why we disagree with this claim.

 [9] Within a couple decades after Darwin’s book was published, / most scientists had accepted the first of Darwin’s two claims--the idea of universal common descent.

[10] The second claim—natural selection—was not accepted for many decades.

[11] Why? At the time of Darwin, little or nothing was known about the inner workings of the cell. / Scientists didn’t know about mutations, so they didn’t know how variation was generated.

[12] They didn’t know about genetics, / so they didn’t understand how traits were passed on to offspring.

[13] In addition, a scientist named Lord Kelvin had recently estimated that the earth was 15-20 million years old. Scientists doubted that natural selection could have produced enough change in that amount of time to account for the diversity of life we see today.

[14] During this period of many decades—/ sometimes called the Eclipse of Darwin--scientists suggested other mechanisms to explain evolution. / It was not until about 1940 that the majority of biologists accepted the main tenets of Darwinism.

[15] And this is where Neo-Darwinism comes in.

[16] In the 1930s and 40s, more than 70 years after the original publication of Darwin’s book, scientists synthesized the newest information from molecular biology and genetics with Darwin’s theory of evolution by natural selection. Using mutations to explain the source of variation, and using genetics to explain how traits were passed from one generation to the next, / many scientists became convinced of the validity of Darwin’s second main claim.

[17] There are several different names for the modern version of evolutionary theory established by scientists in the 1930s and 40s. It is sometimes called Neo-Darwinism, the Neo-Darwinian synthesis, or the modern synthesis. / Although it took over 70 years to be accepted by the scientific community, it has been the reigning scientific paradigm for many decades since that time.

[18] Neo-Darwinism, or the Modern Synthesis, is summarized by these two propositions / Gradual evolution results from small genetic changes that are acted upon by natural selection. / The origin of species as well as macroevolution can be explained in terms of natural selection acting on individuals. /In other words, like Darwinism, it says that lots of small changes, accumulated over lots of time, amount to macroevolution.

[19] Darwin’s four postulates were restated as follows:

* Because of mutation and the recombination of alleles (genetic material) as reproduction takes place, individuals in a population vary in the traits they possess
* Individuals pass their alleles on to their offspring.
* In every generation, some individuals are more successful at surviving and reproducing than others.
* The individuals that survive and reproduce most have the best adaptations. This idea has sometimes been called “survival of the fittest.”

[20] If Neo-Darwinism sounds a lot like Darwinism, that’s because it is! What makes Neo-Darwinism different is that, because of the advances in science since Darwin’s time, Neo-Darwinism is able to offer explanations for *how* variation occurs in populations and *how* organisms pass on their traits to the next generation.

[21] Even though it took many decades for scientists to accept all of Darwin’s theory, it turned out to be a very successful theory.

[22] A theory is considered to be successful / if it organizes and explains groups of data, / if it can suggest research to test those explanations, / and if it can predict the outcome of experiments. Darwin’s theory has been very successful at doing these things. It has been successful in organizing and explaining a broad range of biological data. It provides explanations and suggests ways to test them. In many cases the theory successfully predicts the outcome of experiments.

[23] For these reasons, many scientists have great confidence in the theory. / It is more widely believed by scientists today, after 150 years of research than it was in Darwin’s lifetime.

[24] However, after being the reigning paradigm for several decades, Neo-Darwinism is again being questioned, even by some evolutionary scientists. / In his book Darwin’s Doubt, Stephen Meyer states that leading figures in several subdisciplines of biology…now openly criticize key tenets of the modern version of Darwinian theory in the peer-reviewed technical literature.

[25] Even though they may accept the theory of universal common descent, / many scientists question whether natural selection acting on random mutations can explain the existence of organisms as diverse as a giant Sequoia, / a microscopic Paramecium, / humans, / and snails.

[26] In 2008 a group of 16 evolutionary scientists met in Altenberg Austria to discuss modifying or extending the existing Modern Neo-Darwinian Synthesis. / The Altenberg 16, as they were called, believed modification was necessary because they recognized that mutation and natural selection are inadequate to explain macroevolution.

[27] According to Stephen Meyer, “a host of distinguished biologists have explained in recent technical papers that small scale, or ‘microevolutionary’ change cannot be extrapolated to explain macroevolutionary innovation.” / In other words, they recognize that lots of microevolutionary change over lots of time / does not equal macroevolution.

[28] To summarize:

* Both Darwinism and Neo-Darwinism include the idea of universal descent from a common ancestor.
* Both also include the idea that the mechanism for evolution is natural selection.
* Neo-Darwinism uses the advances in science since Darwin’s time, to explain variation and how individuals pass on their genes to their offspring.
* In spite of doubts in the scientific community about natural selection as the mechanism for evolution, Neo-Darwinism remains the dominant explanation for the diversity of life we see around us. It is published without qualification in textbooks and is affirmed and disseminated freely by the media.

[29] We have described the claims of Darwinism in this presentation, but we do not accept either the theory of universal common descent or the idea that lots of microevolution adds up to macroevolution. In later Origins 101 presentations, we will explore the evidence…

[30] …but first we will look at some common misconceptions that people have about the claims of evolution.