

## Session 3

### Slide 1:

The purpose of this session is to give you a general understanding of the Theory of Evolution as taught in textbooks. Sometimes well-meaning Christians dispute the Theory and bring up points that the Theory doesn't explain or even teach. When this happens, it discredits the Christian as being ignorant and therefore weakens his position in the discussion.

It is not my intention to review all of the scientific evidence leading up to the Theory of Evolution, nor do I intend to delve too deeply into the topic. This segment outlines a general overview, as presented in most science texts.

One caveat. As I present the Theory of Evolution to you, it may appear as though I am teaching Evolution. Whenever we teach about Evolution, we must be careful to keep in mind that we are teaching about Evolution and not teaching Evolution. The textbooks try to present Evolution as very logical, easy to understand, and straightforward. Of course, the hidden agenda is to present this logically, almost as if to say, "Why would anybody question this?" We will deal with some questions about Evolution and our responses later.

### Slide 2:

Most people associate the Theory of Evolution with the writings of Charles Darwin. His book, *On the Origin of Species*, brought the Theory of Evolution to the forefront of biology. It is not the purpose of this presentation to give a detailed biography of Charles Darwin. However, there are a few points worth mentioning. The first point is that Charles Darwin didn't come up with this Theory on his own. He drew upon the work and idea of others to synthesize his Theory. The second point is that by all accounts, Charles Darwin never intended to try to discredit religion. Darwin was trying to keep his explanation scientific, but he was fully aware of the religious implications.

Charles Darwin was a very gifted scientist. His keen mind could make observations and link those observations together effectively. He conducted numerous brilliant experiments, some of which lasted for years. Most of what Darwin wrote in his book is accurate. Where we Christians disagree with him is in his conclusions.

### Slide three:

There has been speculation as to why he published so late. Some biographers feel it was out of respect for his wife's religious beliefs that he delayed publication. Others think it was because Darwin never considered his work complete. There is general agreement that he published because Alfred Wallace was preparing to publish his Theory of Evolution, which was remarkably similar to Darwin's.

Regardless of his reasoning, his book became an instant success. Never in the history of science has a new idea that adopted as quickly and thoroughly. His ideas immediately permeated all the Life Sciences and even spilled over into some other sciences. While a complete study of that history of the development of Evolution is a fascinating study, it goes beyond the scope of our study, and so we will leave it here.

### Slide four:

Much of Darwin's book can be summarized with these two points. Darwin spends a considerable amount of time talking about artificial selection, which was well known and widely practiced since antiquity. Darwin's main thought is that since artificial selection can produce change relatively quickly, natural selection must be the agent of change in the natural world.

Keep in mind that Darwin did not have a good background in cellular biology or genetics. These disciplines were still unknown. The average high school student has a better grasp of cellular biology and genetics than Darwin ever did.

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Based on his observations, Darwin proposed four postulates as to how Evolution works.

The first is the concept of variation. Darwin noted that individuals within a population differ from each other. These differences may affect how well an individual can function in its environment.

The second concept is that of heritability. Darwin noticed that these differences amongst individuals could be passed to offspring.

The third concept is that of over reproduction. And in most natural populations, more individuals are produced than can compete and survive in an ecosystem. The excess individuals must either migrate out or die.

The fourth concept was that of selection. Of the excess offspring, only those that are the most fit will survive and reproduce. I will speak more about fitness on the next slide.

It's interesting to note that we Christians do not debate these points. We can see that Darwin observed the natural world accurately, and we do not have a problem with these four postulates.

Slide six:

To understand Evolution, we need to understand the idea of fitness. Fitness is defined as the ability or likelihood of an individual to reproduce. Fitness is measured by the number of offspring that an individual produces. An individual is more fit if its variations give it a better chance of producing more offspring than the other individuals around it. So fitness depends upon the environment and the individual's ability to function in that environment.

Too often, we equate fitness with the "Survival of the Fittest" mentality. Fitness is not being the biggest, the strongest, the fastest, or the meanest. Strength or size may contribute to fitness if they enable an individual to reproduce more. More often, however, fitness is much more subtle and less obvious. For example, an individual may have a 5% increased resistance to a local bacterial infection, which confers better fitness. An individual may possess an increased tolerance for a wider variety of foods, which would confer better fitness. Most times, the specific factors that increase fitness work in conjunction with other factors and are therefore very difficult to define. Rarely is a single trait the deciding factor in fitness.

Slide seven:

This graphic is a typical diagram of how a textbook would illustrate natural selection. The illustration begins in the upper left-hand corner, where we see two individuals. I have represented them as

diamonds of two different colors. The trait is not necessarily color; I use colors to differentiate the two individuals. The two colors could represent any traits that we choose. Over time the population of these individuals will increase, and we will see individuals possessing the two different traits. Due to environmental conditions, individuals possessing the green trait are more fit than individuals possessing the yellow. I have represented that by placing X's through some of the yellow individuals. Understand that those X's do not necessarily mean that the individuals died. What it does mean is that the yellow individuals were not as successful at reproduction. The outcome is that there are more individuals possessing the green trait than there are those that possess the yellow trait. The process is presented as being very straightforward and easy to grasp.

Slide eight:

There are several points to note about natural selection. The first point to note is that natural selection acts on the individual based upon the difference of traits. Natural selection is blind to the genetics; all it sees are the actual traits. The result of natural selection, however, is a change in the gene pool. In our example, the population evolved because the presence of the gene for the green trait is more common than the gene for yellow. Given enough time, it is possible that the genetics for the yellow trait will completely disappear from this population and so become lost, and genetics for that trait indicated by green would become fixed. This change in the gene pool is Evolution.

So while natural selection acts on individuals, it's not the individual that evolves, it's the population.

Slide nine:

There are some observations we need to make about natural selection. The first observation to note is that there is no guiding force behind natural selection. It's not as though something was directing Evolution to make something bigger or better or more advanced. So, therefore, the idea that populations are evolving to be better or to achieve perfection is not something that Evolution teaches.

Related to that is the idea that Evolution is not purpose-driven. In other words, it can't look forward in time to determine that this trait will be useful and lay the groundwork for that trait. If the trait is not immediately useful, that is, it doesn't confer better fitness; natural selection won't act on it. For example, birds did not evolve wings so they could fly. That implies purpose.

Another point to keep in mind is that natural selection can only act on heritable traits. That means that the genetics for the trait must be coded into the gametes, egg and sperm.

And once again, it's worth repeating that Evolution doesn't produce better individuals; it acts by altering the frequency of genes in the gene pool. Populations evolve; individuals don't.

Slide 10:

If we could rewind natural history, the Evolutionist would conclude that at some point, there must have been one single life form. On the diagram, I have indicated that first life form as the point where all the other branches originate. The abbreviation LUCA stands for "last universal common ancestor." This organism is the ancestor of all of the subsequent species on earth. This diagram shows the three main branches of all life on earth, all descending from the last universal common ancestor. Over the course of millions of years, natural selection has altered species into the diverse number of species that we observe today.

Slide 11:

This graphic is a diagram of a phylogenetic tree, also known as a cladogram. The diagram is intended to show how species evolve from common ancestors; wherever we see lines branching from a single point, that point is called a node and represents a common ancestor, very likely extinct.

This diagram represents the Evolution of the eukaryotic creatures, which are, for the most part, multi-celled creatures. Any two groups can trace their lineage back to a node at some point in evolutionary history. The closer than noted to modern times, the more closely related the two groups are thought to be. For example, the three clades grouped under the heading plant would be considered much more closely related to each other than frogs and euglena.

An interesting side note is that there is an attempt to classify every single living creature, whether presently alive or extinct, into one big gigantic tree. The Tree of Life Web Project is attempting to gather genetic data to construct that single tree. What becomes interesting about a project like this is the amount of disagreement when it comes to classifying and grouping of living things. So much depends upon the arbitrary selection of criteria. To put frankly, it's a real mess.

Slide 12:

This phylogenetic tree is simply an expansion of the last group of the previous diagram. We have zoomed in on that last group of the furthest to the right to show even further relationships. This diagram also includes some of the criteria that were used in placing species into groups. So, according to this diagram, we can see that amoeba and animals that we are familiar with share a common ancestor.

Slide 13:

The Theory of Evolution is not complete. As the Life Sciences progress, the Theory is being refined. Unless you are teaching a high school biology class, you will likely not run into these concepts that you see here. I include this to show you that the Theory of Evolution is changing. You probably will not need to understand that these new concepts, unless you wish to make a more in-depth study of Evolution.

Take comfort in the fact that even with a minimal understanding of these advanced concepts, a Christian is still able to mount a believable response to the Theory of Evolution.