

Extraordinary discoveries and remarkable creatures: the development of the theory of the origin of species

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For most of their existence, humans have questioned where they came from, how the earth works, and where the remarkable creatures throughout the world originated. Pioneers in science conceptualized the idea of evolution, which would one day help to answer these questions. But before the theory of natural selection and evolution could be formulated, more basic questions had to be asked and answered. Darwin, Wallace, and Bates were three of the most important pioneers in obtaining the evidence that would lead to the unraveling of ecological history and the determination of the origins of species. These men were the start of the "Darwinian Revolution." They were the beginning of the discovery of the evolution of man and other species.

In his book, *Remarkable Creatures: Epic Adventures in the Search for the Origins of Species*, Sean B. Carroll outlines some of the discoveries that have led to the present-day explanations of the origin of species, which are currently backed by the scientific community. He separates myth from reality to provide answers to some of the most asked questions about humans and the world they live in. Carroll is a respected Professor of Molecular Biology, Genetics, and Molecular Genetics at the University of Wisconsin. He has also written two books, in addition to *Remarkable Creatures: Epic Adventures in the Search for the Origins of Species*, including *The Making of the Fittest* and *Endless Forms Most Beautiful*. Through the use of great detail when describing the lives and discoveries of more than seven scientists, Carroll provides examples of the advancement of ecology and the theory of evolution throughout the history of science.

Pioneers of science initially explored various lands and made observations about the plants and animals they witnessed. Later, these pioneers developed theories pertaining to why there are birds that look related, but live in a different area, or where a particular species originated. Carroll describes these initial observations from the very beginning with Humboldt. Humboldt experienced the diversity of South America in 1799. He was the first ecologist to experience and express to the scientific community how diverse the different continents are and how drastically species differ from one to the other. Although he did not quite understand why this was so, this initial observation was the driving force for other ecologists. The wonders of the pre-Columbian world were almost magical to Humboldt and his colleague, Bonpland. These wonders were documented in a book and sparked the interest of multiple scientists throughout Europe, including Darwin, whom Carroll discussed next in his book. Through observations and collections of specimens during his trip to the Galapagos islands, Darwin developed the theory of natural selection. One of the biggest influences on this theory was the Galapagos finches with different beak sizes for different kinds of foods. Wallace had similar discoveries as Darwin and the men were co-published.

The next huge breakthrough in the sciences revolved around the discovery of fossils and bones of various species. Dubois was the first to find an intermediate between humans and primates, dubbed Java man. This discovery was an amazing finding for the scientific

community. It showed that there was much more to learn about the human species than was previously thought. Around the same time period, another transitional species was discovered, the Fishapod. This creature was the intermediate species between both a fish and a terrestrial species. The idea of a fish with legs received incredible amounts of skepticism from the scientific community. Scientists continued to find more and more "missing links" between completely different species over decades of archeological digs. However, there would always be another "missing link," a species or an individual that brought one species to be more related to another species. As one researcher in Carroll's book put it, "it is not 'the' missing link, its 'a' missing link. It's no longer missing- it's a found link."

After identifying that there were transitional forms between not only birds and reptiles, but also humans and primates, and fish and terrestrial creatures, it became a high priority to more easily and clearly identify relationships between species and their transitional forms. As research continued, technology began to become more advanced. Scientists started using DNA in order to match alleles in humans and apes. By doing so, they were able to identify that there was indeed a connection between the two species and visualize how closely related they were. Carroll explains that scientists understood that there were various forms leading to the current human species, such as skeletons of *Homo erectus*, *Neanderthals*, and *Homo sapiens*. By dating these skeletons, and observing their DNA, it became possible to identify a pattern of modern diversification.

Scientific discoveries have changed the way humans look at their world around them for the past two centuries, but these findings have also been disputed, refuted, and accepted at an extremely fast pace. Just two hundred short years ago, almost nothing was known about the evolution of species. Entire countries were still unexplored. Today, humans know more about their history and the history of the planet they live on than could have ever been imagined. There is a question of whether or not there are any remarkable findings left to be discovered. In his book, Carroll mentions how Darwin hid his findings from the public for years. People in this time were very closed-minded about particular aspects of science, especially when they contradicted what could be read in the Bible. This may have slowed down the rate in which the biological world advanced. If Darwin had published his work sooner, we might know more than we currently do. Although we know much more in comparison to what was known two centuries ago, new discoveries will always be available for scientists. NASA is currently searching for new worlds in outer space. As humans discover more with technology, they will be able to learn more about the past, as well as the current world.

Remarkable Creatures is a piece of literature that can be directed not only towards scientists and students interested in ecology, but also anyone who is interested in history, or anyone who is mesmerized by the diverse planet in which they live. The book was a very quick read with a large amount of information that was easy to comprehend. Many of the same topics covered in mid-level Biology college courses were discussed in Carroll's book, primarily evolution and ecology classes. The diversity of species was presented, as well as the topics of evolution, transmutation, natural selection, and species interactions. The novel

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included excellent examples of specific discoveries, such as the first fossils used in order to support the theory of evolution, or the realization that certain species resembled each other as a form of protection, as in butterflies. These examples provided a better understanding for the course material. The book also added personal histories of the scientists who have made some of the most important discoveries in the history of ecology and evolution. Carroll made the scientists seem less like fictional characters in a story by allowing the reader to relate more to them by describing how some scientists, such as Darwin, disliked school, or how Roy Chapman Andrews collected bugs, stuffed animals, and plants in his longing to be a famous ecologist.

Remarkable Creatures: Epic Adventures in the Search for the Origins of Species is a scientific novel that presents the most significant ecological pioneers and expeditions in an almost fairytale-like manner. Unlike many books containing large sums of scientific information, this novel allows the reader to stay interested through the entire duration of the read. The primary idea that Carroll shares throughout his book is that over a short period of two hundred years, scientists have made a huge breakthrough in understanding how species have become what they are today and how they have evolved from ancestral species. Almost all scientific findings can build upon one another to provide a larger picture and a more elaborate explanation of the discoveries that have been made over the past two hundred years. Often the greatest and most extraordinary findings are met with extreme levels of skepticism, but the scientists who back up their findings are the ones who make names for themselves and are given a place in history.

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