

Darwin's legacy: variation, natural selection, and the perpetual struggle for exi...

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In an age of scientific advancement, it is easy to take for granted a number of widely-held facts and theories that have been largely substantiated by scientific inquiry. One of these fundamental theories is the theory of evolution-- much of science and medicine is built upon the foundation of evolutionary theory. Without an understanding of evolutionary theory, modern medicine would not have advanced to the point that it has; humanity's ability to produce vaccines and do work on genetic diseases and stem cells would be severely curtailed, if not impaired entirely. Indeed, without Darwin's introduction of evolutionary theory, humanity's understanding of genetics as a whole would be woefully inadequate; without Darwin's introduction of evolutionary theory early in the Age of Enlightenment, humanity may not even have discovered DNA yet. Darwin introduced a number of groundbreaking theories into the scientific community, many of which the scientific community is only just beginning to explore in depth. Most notably, Darwin expanded upon three aspects of evolutionary theory: variation, natural selection, and the overall struggle for existence.

Variation

One thing that scientists have long noted but been unable to fully explain is the amount of variation that appears throughout species on the planet.

Darwin himself noted this variation, paying specific attention to domesticated animals. Darwin began his explanation of variation with domesticated species for a very specific reason: people were able to see variation in domesticated species very clearly. Everyone is familiar with different looks and breeds of dogs, for instance; it is easy to accept that dogs

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change in look over time, because breeding dogs (or livestock, for instance) was practiced frequently during Darwin's time (Darwin and Quammen).

Darwin writes:

When we compare the individuals of the same variety or sub-variety of our older cultivated plants and animals they generally differ more from each other than do the individuals of any one species or variety in a state of nature we are driven to conclude that this great variability is due to our domestic productions having been raised under conditions of life not so uniform as, and somewhat different from, those to which the parent species had been exposed under nature No case is on record of a variable organism ceasing to vary under cultivation. Our oldest cultivated plants, such as wheat, still yield new varieties: our oldest domesticated animals are still capable of rapid improvement or modification. (Darwin and Quammen)

In short, Darwin is adamant that there is no case of a plant or animal existing without variations, and that no evidence has ever been found to suggest that organism that should vary upon cultivation fail to do so in certain circumstances.

Darwin's *On the Origin of Species* was not as contentious of a text as some of his previous work had been, but it still aroused much international interest. One reason that the text aroused as much interest as it did was because of the time in which it was released-- there was much public interest in science and scientific advancements in the mid- to late-nineteenth century (Gamlin). However, there was still a very strong religious undercurrent in most societies, a fact which Darwin was well aware of. In *On the Origin of Species*, he writes: " see no good reasons why the views given in this volume

should shock the religious views of anyone” (Darwin and Quammen). Darwin recognized his theory as potentially having fallout in the religious community, and recognized that his theory represented a large paradigm shift for society, but felt that it was relatively easy to rectify one’s religious beliefs with the theory of evolution.

One thing that is very difficult to rectify, however, is the issue of individual acts of creation in terms of evolutionary theory. It is an easy thing to accept that somehow a creator kick-started the process of evolution by making the environment on earth correct to support life, and tweaking circumstances so that the desired outcome arose; what cannot be rectified is the magical introduction of a new species that appeared without the mark of evolutionary influences or natural selection.

Natural Selection

Natural selection is a theory posed by Darwin that states that an organism that presents variations that are advantageous in their specific environment are more likely to reproduce and thus, pass those variations onto their offspring. Over a long period of time, these variations may become standard in a species, or they may become disadvantageous as the environment changes (Darwin and Quammen). If a variation becomes disadvantageous in an environment, then organisms may begin to die off earlier and be unable to pass their genetics on to offspring, changing the course of evolution again (Darwin and Quammen).

It may seem illogical that small variations in genetic sequences could lead to such large variation in animals and plants, but taken in context of the

geological age of the earth, these changes are minute and add up over many millions of years. A human being, for instance, is not going to obtain the ability to see ultraviolet light within a few generations; however, if a predator were to arise that required human beings to see in the ultraviolet spectrum, humans would either adapt over time or be wiped out because the predator was too efficient at trapping its prey. It is clear from genetic testing and observation of behaviors that humans and great apes share a common ancestor, for instance; divergent evolutionary tracks have merely led humanity to one group of behaviors over many millions of years, and the great apes to others (Gamlin).

One of the most common arguments against evolution is the argument that there are components of the human body that are too complex to be the result of evolution (Toumey). However, Darwin writes: “ If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find no such case” (Darwin and Quammen). This is a much more logically-sound and scientifically well-supported approach to the diversity and complexity of life on the planet than the theory of creation.

Struggle for Existence

Every organism is fated to struggle for existence on this planet. There are apex predators, of course-- those that have adapted so well that they have topped the food chain-- but even these predators must struggle for survival. There is no evidence that can be found of any animal merely coming into

existence, and many hundreds of years of scientific testing has been done to determine whether spontaneous generation is possible (Gamlin). Darwin postulated that more offspring than can be supported by the environment are often produced. This is because of the previous two theories posed: first, that certain individuals will be more likely to succeed in an environment, and second, that variation will happen-- and sometimes that variation will not favor the organism. Some of the offspring will die; this is a reality of evolution.

Evolutionary forces are harsh, but they push organisms towards the best fit for their environment. There is no theory that has been put forth before or after the theory of evolution that fits the order of the natural world as well as the theory of evolution does.

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