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# RANDOM AND ARBITRARY CONTINGENCIES IN HISTORY OF SCIENCE AND TECHNOLOGY [3] – THE BASIS OF NATURAL SELECTION IN DARWINIAN THEORY OF EVOLUTION

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## ABSTRACT

According to Lamarck's use and disuse theory, the biological evolution has a definite purpose and direction. However, Darwinian concept of mutation as well as natural selection is solely based on random and arbitrary pure chance. This random and arbitrary contingency becomes the primary cornerstone for all modern biological sciences.

**KEYWORDS:** Lamarck's use/disuse theory, mutation, natural selection, teleology, final cause, randomness, Mendel's genetics, Darwinism, pure chance

## INTRODUCTION

In the early 19$^{th}$ century, Lamarck suggested his theory on the inheritance of acquired characteristics, in other words, Lamarck's use and disuse theory of evolution. This is a form of biological teleology which originated from Greek, telos, "end, purpose" in the ancient Greek philosophy of Aristotle. The final cause or the purpose of a thing is essential in Lamarck's theory of evolution. So, the function of an organ in an organism evolves to achieve the purpose of the organ. For example, one of the most famous case of the use and disuse theory is the long neck of a giraffe which can reach up to a few meters in length. According to Lamarck, these long necks evolved for reaching food such as fruits and foliage high up in some trees, after several generations of trials by the individual animals to get the food. Thus, the long necks and their related evolutions have a definite purpose and direction. In other words, for a giraffe to get some food through generations of trials, the evolution achieves the final cause of a giraffe's long neck in Lamarck's theory of use and disuse.

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**Natural Selections of Randomly and Arbitrarily Breeding Certain Suitable Traits**

The belief on a certain definite direction in the course of biological evolution was deeply challenged by English naturalist Charles Darwin in 1859 when he published the idea of natural selections in his book, *On The Origin of Species*. Natural selections guarantee that the more suitable traits an organism has in a given environment, the more it has a chance to survive in that environment. In contrast to artificial selections where humans intentionally choose which individual organisms to survive and reproduce, as in the case of domesticating dog breeds from those of wild wolves, natural selections are randomly and arbitrarily breeding certain suitable traits in a given environment among many varieties of them, inducing the so-called Darwinian evolution in a long run.

Darwin derives his idea of natural selection from his observation on Darwin's finches in *Voyage of the Beagle* (republished in 1977), a species of birds whose beak shapes are dramatically different depending on the islands of Galápagos to suit various food sources on the particular islands, although the finches' size and color are very similar regardless of the birds' origin of the islands. Darwin conjectured that these finches on the Galápagos had a common ancestor which arrived on the islands from the mainland of South America many millions of years ago. Later, the birds developed a variety of beak shapes on the island. But each island's environment is not the same and this varying environment allowed a certain type of beak shape to survive in the island. This adaptation of specific beak shape served essential for the survival of the birds in the island, leading to a particular beak shape on a specific island. Thus, this natural selection on finches' beak shape was a cornerstone for Darwin's theory of evolution.

The reason behind the diverse varieties of traits, in this case, finches' beak shapes, was unknown at the time of Darwin, although known as the gene mutation in modern biology text books. However, whatever the reason behind, he already realized that the finches' original developments of various beak shapes were totally arbitrary after they arrived at the islands from the mainland. On top of it, he firmly believed that the random processes of natural selection resulted from the distinctly varying environment of each island.

Therefore, the idea of mutation as well as natural selection was based on arbitrary randomness of pure chance. This basis of Darwinian theory of evolution was a primary target of social, religious and scientific debates, especially, after the publication of *The Descent of Man* in 1871 (Darwin, 1875). Those who disagreed with Darwinism protested that the evolutionary developments from apes all the way up to humans could not be an outcome of totally random and arbitrary pure chance since human ethics cannot be random and arbitrary. In fact, Mendel in the 1860s suggested that certain traits of beans can be reproduced generation after generation in a discrete rule of 3:1 from ancestors to descendants, denying a random and arbitrary nature of the Darwinian theory of evolution.

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Nonetheless, in 1930s, in spite of social, religious and scientific controversies, Darwinian theory of evolution based on random and arbitrary natural selection was combined with Mendelian genetics to become the modern theory of genetics. Today, Darwinian theory of evolution has become the primary cornerstone for all biological sciences. Thus, the idea of random and arbitrary pure chance is well received in biological sciences, in spite of the continuing social, religious and scientific debates against it.

## CONCLUSION

The basis of natural selection as well as mutation in Darwinian theory of evolution is random and arbitrary pure chance, although not well accepted by some even at this moment. This idea of random and arbitrary pure chance has become the primary cornerstone not only for mutation and natural selection, but also for explaining all biological processes, despite the continuing social, religious and scientific debates against it.

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