



Explanations for the Existence of Current Species Diversity

KeyWords

- naturalist /'nætʃərəlist/
- fossil /'fɔːsəl/
- catastrophe theory /kə'tæstrəfi 'θiri/
- catastrophism /kə'tastrəfɪzəm/
- fixism /'fɪksɪzəm/
- immutable /ɪ'mjuːtəbəl/
- theory of infinite transformations /'θiri əv 'ɪnfənət trənsfər'meɪʃənz/
- transformism /trənsfɜːmɪzəm/

The organisms that inhabit the planet are varied, but they do have characteristics in common, such as the life cycle. They all are born, grow, reproduce, and die. In addition, they all relate to their surroundings and must eat to survive. Living things have changed over the history of Earth. Even though scientists didn't at first think it possible, they eventually realized that these changes were real and were the result of natural selection, a process of evolution over millions of years. To arrive at this concept, they went through many theories and lines of inquiry over the course of history.

Two centuries ago, most people knew little about the biodiversity of the planet. The distinct species that inhabit each continent became known thanks to the explorations of the **naturalists**. Prior to the twentieth century, this was the term used for scientists who studied plants, animals (living or dead and preserved in rocks), and minerals. However, the naturalists thought that species had always had the same form and considered them static, fixed, or immutable. Due to a lack of information, they did not believe that species could change over time.

Did you know...?

A **fossil** is any remnant or impression of the body of an organism that lived in the past and was preserved in sedimentary rock. For a rock with the impression of an organism to be considered a fossil, it must be at least 10,000 years old.



At the beginning of the nineteenth century, paleontologists in France, such as Georges Cuvier (1769–1832), discovered several species of animals from different continents, and many were fossils.

Cuvier explained that the fossils were representatives of extinct forms of animals. However, he believed that all species had appeared at the same time as humans and that there were no relationships between them. For him, the only difference between the fossilized species and those that remained alive was that the first had become extinct, as a group or en masse, due to some natural catastrophes in Earth's history. This is called **catastrophe theory** or **catastrophism**.

Cuvier said that the species that had survived the catastrophes were lucky, as they had escaped these great extinctions. This type of thinking is known as **fixism** because it posits that species were fixed and did not change over time. In other words, they were **immutable**.



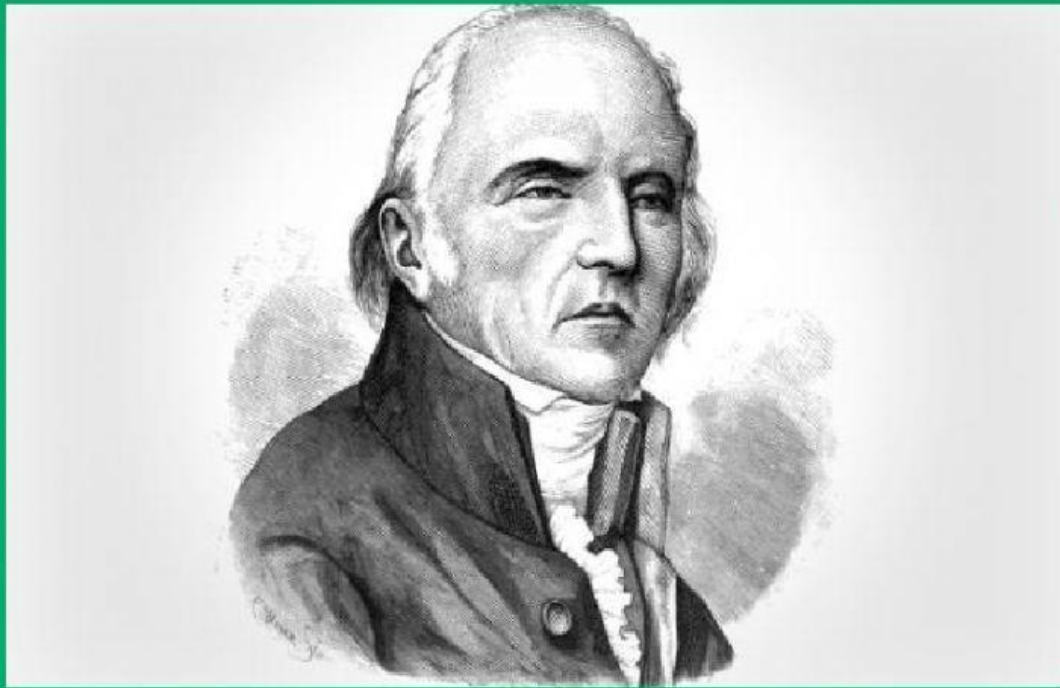
In the second half of the eighteenth century, another naturalist, Georges Louis Leclerc, the Count of Buffon (1707–1788), proposed that living things changed their characteristics due to new conditions of climate or food. This happened when they migrated from their original location to another place. Leclerc called these ideas the **theory of infinite transformations**. His most famous work is titled *Natural History, General and Particular*. It contains 44 volumes and eight more that were published after his death.

Although the Count of Buffon began to think about an evolutionary idea, he did not go so far as to break with the thinking promoted by the church at the time. Nevertheless, his main contribution was to recognize that species do undergo changes and to point out that some species had even disappeared.



At the beginning of the nineteenth century, several hypotheses were put forward. One of the most popular was proposed by the Frenchman Jean Baptiste Lamarck (1744–1829), a student of Buffon. He dedicated himself to the study of the fossils of invertebrate animals, species represented by mollusk shells. He observed that in different geological strata, there were organisms that were simpler than those found in the more recent layers. He suggested, therefore, that organisms changed or transformed continuously over time due to an internal "desire" to change and that the characteristics they acquired were then passed down to subsequent generations. This type of thinking is called **transformism**.

By observing fossils, Lamarck deemed that all species stemmed from other, more ancient species. These results put into doubt the theory of catastrophes proposed by Cuvier. Lamarck also pointed out that if living things habitually used a specific body part or organ, there was an enlargement or perfection of that part. Conversely, if parts went unused, they became weaker, smaller in size, and eventually disappeared.



Most naturalists in the eighteenth century maintained the vision of species as fixed or immutable. Cuvier, and other researchers aligned with him, did not want to recognize the relationships between species proposed by Lamarck through the succession of fossils. They rejected the transformist theory of use and disuse proposed by Lamarck and the Count of Buffon to explain the adaptation of species to the environment.



One example of Lamarck's theory is that of the giraffe. He claimed that their necks had become elongated as the result of the need to reach branches on tall trees.

Throughout history and as the evidence advanced, the understanding of the evolution of living things changed. Many researchers and naturalists made proposals about how species emerged or changed. Some did not believe in this change. In other words, they believed in the "immutability of species." These people were known as fixists. Thanks to the fossil evidence, it was possible to prove that organisms had not always been the same. George Cuvier proposed that the differences observed in fossils were caused by catastrophes that killed off organisms, but he did not believe there was any relationship between these differences. On the other hand, Georges Louis Leclerc, the Count of Buffon, pointed out that living things changed due to new climatic or food conditions. His student, Lamarck, spoke of the continual change of species called transformism.

• Match the columns as appropriate.

Jean Baptiste Lamarck	Living things change their characteristics when they migrate from one place to another. They are influenced by climatic and food conditions, and these drive adaptations.
Fixism	A remnant or impression of an organism that was preserved in rock.
Georges Louis Leclerc, the Count of Buffon	Species preserved in fossils became extinct en masse due to natural catastrophes in Earth's history.
Georges Cuvier	Continuous transformation of species or transformism.
Fossil	Species continuously undergo transformation over time, influenced by the use and disuse of certain body parts and the climate.
Transformism	Species do not change over time.