Examine the role of Lamarck's thoughts in the development of modern evolutionary theory

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Modern evolutionary theory did not come out in one day, it was a collection of thoughts and theories by a number of philosophers and scientists across ages. Jean-Baptiste Lamarck was a French naturalist who is mostly well-known for his evolutionary thoughts. And while his thoughts have been fully abandoned for a long time, it is still worth carefully looking at his ideas to get a better understanding on how we reached what we have today. However, analyzing his ideas from a modern perspective alone may not be the best way to find out its actual role in the history of evolution. In this paper, I will be carefully examining the role of Lamarck's evolutionary thoughts from the perspective of the pre-Darwinian time and later, to understand how it systemized the existing ideas at that time, and how it subsequently affected Darwin's theory of natural selection.

Section One: Background

Prior to the 17th century, essentialism was the only and most popular belief in regards to whether species change over time or not (Darwin, 2012). It holds the theory that species are unalterable and immutable, and remained to be supported by the majority of naturalists until the theory of natural selection came out (Darwin, 2012). However, starting from the 17th century, a small number of philosophers and naturalists adopted a more materialistic view regarding if and how species change over time. One common thing about their ideas,

was that they all recognized that species are not unalterable, which fundamentally rejected the essentialism

In 1809, Lamarck published ‘Philosophie Zoologique’, where he systemized the new materialistic thoughts and proposed the concept of transmutation of species. Challenging an idea that had persisted for a long time was not an easy task, Lamarck and other people who held similar thoughts were attacked by the more conservative thinkers at that time.

Section Two: Lamarck’s views on evolution

So, what exactly did Lamarck propose in his theory of transmutation of species? There are mainly two parts of his thoughts of evolution. The first part is that he believes that lives are undergoing a process that makes species more and more complex, whereas the simplest form of lives are created through spontaneous generation again and again, and they keep complexifying over time. Another part of his theory explains how Lamarck thinks the mechanism of adaptation is, and will be explained below (Lamarck, 1914).

There are two principles on this part. The first principle, sometimes known as the use/disuse theory, holds that “a more frequent and continuous use of a certain organ will strengthen and develop that organ, while the less frequent or discontinued use of a certain organ will weaken such an organ”. The second principle, typically known as the “acquired characteristics can be inherited”, states that the characteristics gained or lost by an

individual can be inherited to its offspring. Interestingly, even though this is only part of his evolutionary theory, people often use the word “Lamarckism” to refer to the latter principle, which is not beneficial for a comprehensive understanding of his theory (Lamarck, 1914).

One thing worth noting is that, in terms of animals, Lamarck does not think the change in environment is the direct cause of change in species, he explained the mechanism by saying “alterations in the environment of animals lead to great alterations in their needs, and these alterations in their needs necessarily lead to others in their activity” (Lamarck, 1914). As for plants and invertebrates, however, he did not clearly reject the idea that the change of environment can have direct influence on them.

So, how did Lamarck develop or systemize these ideas? A lot of people remember Lamarck for his theory which states “acquired characteristics can be inherited”, but not a lot of people know that the vast majority of his previous work was in invertebrates, in fact, he coined the word “invertebrate” (Graur, D., Gouy, M., & Wool, D., 2009)

Interestingly, Lamarck did not start his career as a naturalist, and he was a firm believer on essentialist views on species for the first several decades of his career. It was, however, also his work in a group of invertebrates, named “Mollusca”, that transformed him from an essentialist to a person who supports organic evolution. When Lamarck was studying it, he found that Mollusca have three very different types of shapes and forms when living in land or water. The great variety of Mollusca let him think that species are in fact changing, and

that has something with the environment. Lamarck also dedicated a lot of his time into the classification of different taxonomy of invertebrates. In some way, Lamarck's ideas on changing species are largely based on his observations on invertebrates (Mayr, E., 1972).

Section Three: Darwin's view on Lamarck's ideas

While Darwin generally rejected Lamarck's thoughts on evolution, he praised Lamarck's contributions to the modern theories of evolution, in his *An Historical Sketch of the Recent Progress of Opinion on the Origin of Species*, he states that "Some few naturalists, on the other hand, have believed that species undergo modification", and "Lamarck was the first man whose conclusions on the subject excited much attention" (Darwin, 1859)[1].

It is worth noting that, both Lamarck and Darwin were very clear on one thing: species are not unalterable, they keep changing over time, and adaptations are taking place. This fundamentally challenged the ground of essentialism. What differed them here, was their explanations on how the adaptation occurred: Darwin endorsed the theory of Natural selection, where the fittest will survive; while Lamarck believed that the needs of animals are adapting themselves to the change of the environment.

Darwin, on the other hand, disagreed with Lamarck on a number of concepts. Darwin believes that there is a common ancestor to all the species, while Lamarck did not think so.

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[1] *An Historical Sketch of the Recent Progress of Opinion on the Origin of Species was published in the 3rd (1861) edition of his The origin of species by means of natural selection.*

Lamarck believed that those simplest forms of life were the product of spontaneous generation, and that they keep evolving into more complicated creature. Even though their theories are fundamentally different in various aspects, the similarities were still pretty significant, and a lot of concepts used by them are still being used by us.

Section Four: The significance of Lamarck's theory

Today, when people talk about Lamarck and his evolutionary ideas, most people's immediate thoughts were that his ideas are outdated and wrong. People sometimes compare him with Darwin to prove how "wrong" Lamarck was. However, I would argue that this is probably not the best way to evaluate Lamarck and his theories, and does not help us advance our understanding on how modern evolutionary ideas developed at all. Instead, analyzing it through its specific historical context would be more helpful.

The time that Lamarck lived in was a transition time from the old essentialist view on species to Darwin's evolutionary theories. Lamarck, as well as some other philosophers and naturalists at the time, rejected the old essentialist view. Lamarck in particular, systematized the existing ideas at the time (Koonin, E. V., & Wolf, Y. I., 2009).

We do need to know that Lamarck was limited in multiple aspects. While he was an expert on classification and identification on invertebrates, he did not do nearly as much field research as Darwin did. This could potentially let him miss the bigger picture. Additionally,

his ideas were not well-advertised compared to Darwin's opinions, and had less evidence as back up. These limitations may be partly responsible for why Lamarck's thoughts never got wide-spreaded (Corsi, P., & Mandelbaum, J., 1990).

Interestingly, while Aristotle is one of the greatest philosophers and naturalists, he was sometimes heavily criticized for his essentialist viewpoint on species, as well as spontaneous generation. From the modern perspective, he was wrong on evolution, but it is merely a valid reason to reject Aristotle's contribution to biological science. Similarly, while Lamarck may be wrong on the mechanism of how adaptations occur, it is not a sufficient reason for us to ignore his contributions.

Section Five: Conclusions

Rome was not built in a day, modern evolutionary theory was not either. While Lamarck's thoughts on evolution have never been a widely-accepted theory in the history of evolutionary thoughts, his contributions to the formation of the modern theory cannot be neglected. While everyone remembers that Darwin moved evolutionary theory forward with a big step with the theory of natural selection, we should also remember the small steps made by Lamarck and many other previous philosophers. Only by looking at these theories in its unique historical context, rather than a simple "right or wrong" from today's perspective can we fully appreciate the theory we have today.

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