



# Lamarck is back

By [Sophie Veigl](#)

Is Lamarckism back? Current discussions, specifically in the field of epigenetics, seem to suggest that this is the case. Scientists as well as science popularizers describe numerous instances of the inheritance of acquired traits as the vindication of Lamarck. What does it mean, however, to qualify as “Lamarckian” inheritance? And why are we so tempted to connect recent discoveries to the ideas of a natural philosopher, who wrote an ill-received book, the *Philosophie Zoologique*, more than 200 years ago?

In what follows, I will address several questions. What does it mean for Lamarck to be back? Are all cases of the inheritance of acquired traits cases of Lamarckism? What is problematic about calling a phenomenon Lamarckian? And, finally, if it is problematic, why use the word at all?

In recent years, I tried to push back against a very sloppy use of the term “Lamarckian”. Far too often are instances of the inheritance of acquired traits broadly characterized as Lamarckian. However, this is a mistake, as Lamarck did not invent the idea of the inheritance of acquired traits. What was new with Lamarck is that he proposed a mechanism: if a specific faculty of an organism is used extensively, it will get augmented, and this augmentation can be passed on to subsequent generations. Similarly, if a faculty gets disused, it will get reduced, and this reduction can be passed on to subsequent generations. I call this mechanistic underpinning the “use / disuse paradigm”.

While there are many different instances of the inheritance of acquired traits, I believe that only those instances operated by a “use/disuse” process ought to be called Lamarckian. This often requires a “molecularized” interpretation of the terms “use”, “disuse”, “augmentation”, “reduction” and “faculty”. That is, we need to establish correspondences between these terms and molecular entities and mechanisms.

Inheritance systems involving competition are candidate examples for a “use/disuse” process. Imagine scenarios in which a specific resource is limited. This resource mediates the amplification and persistence of specific molecular entities throughout generations. Not all molecular entities that compete for the limited resource will achieve to interact with it. Interacting with a limited resource by an entity means its “use” and results in amplification and augmentation of the respective entity in subsequent generations. Failing to interact means “disuse” and results in the reduction of the respective entity in subsequent generations. I have recently identified two examples of such use / disuse governed inheritance systems: small RNA inheritance in the roundworm *C. elegans* and the CRISPR/Cas system in Bacteria.

So far, I have answered two of the four questions:

What does it mean for Lamarck to be back? – The identification of use/disuse governed inheritance systems!

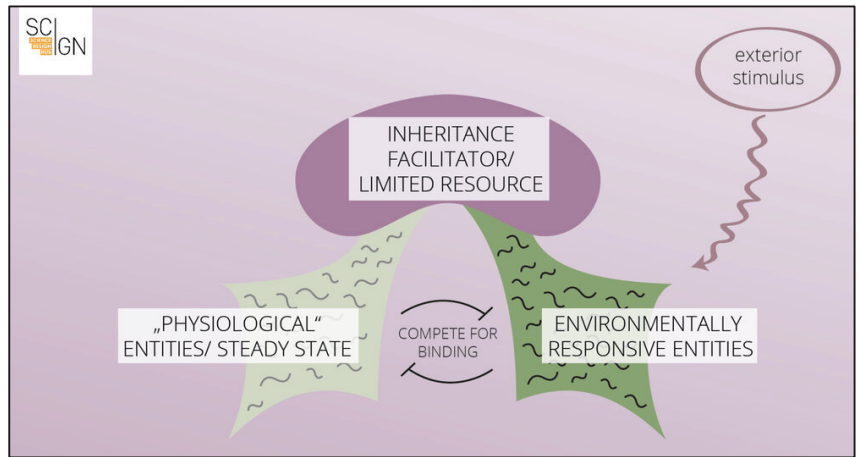
Are all cases of the inheritance of acquired traits a case of Lamarckism? – No, it makes sense to narrow this term down to denote only use / disuse governed processes!

The next question we need to address is what is problematic about using the term “Lamarckian”. One could argue that the operationalization I provided is fairly innocent. It is however important to keep in mind that terms have a history, and this is certainly true for the term

“Lamarckian”. One issue that is tied to its history is “teleology”. Part of Lamarck’s position was the idea that organisms have an innate tendency to evolve towards a definite goal, such as increasing complexity. Additionally, the concept of the organism is strongly associated with an idea of agency. Thus, in a Lamarckian framework, the organism is envisioned to strive towards greater complexity.

Both teleology, and the organism as an actor are not necessarily concepts that are part of the discourse around the inheritance of acquired traits. Use of the term “Lamarckian” might nevertheless unconsciously reintroduce these concepts.

In the last paragraph I examined what might go wrong when we use the term “Lamarckian”. The last thing to do here is to argue why we should still call some instances of inheritance “Lamarckian”. Many terms constantly used by biologists have a long-standing history, and had different meanings, and different connotations throughout history. This is true for concepts such as “organism”, “mechanism” or “the gene”, to name only a few examples. Nevertheless, practice proves that it is possible to use these terms successfully, and, at best, be mindful of their history. Also, we can use such knowledge to understand preconceptions and prevailing forms of representation of these concepts. As we cannot escape the history of the terms we use, we need to be mindful of the way we use them. Explaining the intended connotation is better than trying to keep biology “sterile” of its own history.



Sophie Veigl is a PhD candidate in philosophy of science, based at the University of Vienna. Her academic background lies in History and Philosophy of Science, Molecular Biology and Comparative Literature. In her dissertation, she aims to test a philosophical concept, scientific pluralism, for its resonance with research aims and practices.