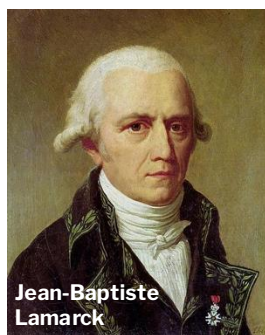


Biological "Misconceptions" are Productive for Students' Sensemaking



#2300437: *Modeling the Conceptual Dynamics of College Students' Reasoning about Natural Selection*

Are Lamarck's ideas Misconceptions?

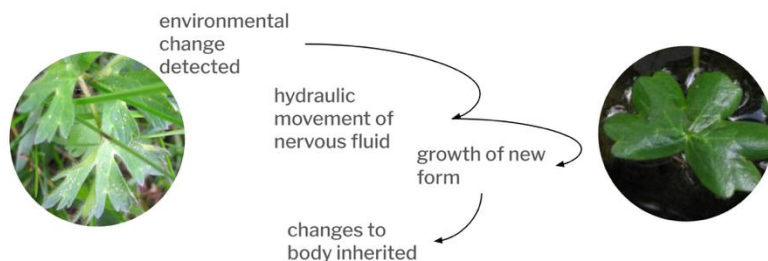


Students are often described as having "Lamarckian" misconceptions:

- environments induce changes
- trait change via use/disuse
- inheritance of acquired changes to individuals

Lamarck was seeking and proposing biological mechanisms

Lamarck's Mechanism



"Lamarckian" ideas Support Sensemaking

While one student, Layla, knows that variation comes from random mutations, she wonders, **how can randomness explain the fit between swimmers and the environment in Indonesia.**



She proposes **change through use and inheritance** of "stronger lungs" as an alternative mechanism to random mutations.

Students are *also* seeking and proposing biological mechanisms

Another student Charlie, is puzzled by why bats would lose eyes if they are useful. He reasons about changes in his own body through **use and disuse.**



He proposes a mechanism for how individual bats **reallocate resources** from eyes to echolocation. Later he integrates this idea with a population-level explanation.

Methods

- Interviewed 13 students; 6 of whom used "Lamarckian" ideas
- Analyzed the function of these ideas in students' thinking using practical epistemology analysis (PEA):
 - Did ideas function to report answers? or
 - Did ideas function to identify gaps and propose tentative mechanistic explanations?

Implications

"Lamarckian" ideas do not block students from reasoning correctly; They do help students reason about questions and propose mechanisms. These ideas should be engaged with — **not replaced!**



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