

Fall 2015

Common Mistakes in Discussing Evolution

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Recommended Citation

O'Leary-Driscoll, S. (2015). Common Mistakes in Discussing Evolution.

Retrieved from: <http://digitalcommons.imsa.edu/evolution/11>

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Using need as a justification

- For example “the turtles developed shells because they needed them for protection”. Just remember that Ms. O’Leary needs wings so she can get home faster when there’s traffic... but alas she is subject to her genetics. If need were a driving factor, lots of processes, organs, limbs, etc., would be a lot more effective and fun!

Missing the connection to reproduction

- It’s all about making babies! Remember, changes within a lifetime that do not impact the genes and their use are NOT inherited (think tattoos, no majorly inked babies are being born!).
- Connect fitness in Natural selection to reproduction. Being the biggest, baddest, fastest cat in the jungle does NOT have an impact on changes in a population UNLESS it results in more offspring from the organism with those beneficial traits than those with less beneficial traits (differential reproduction).

Putting the cart before the horse

- Be careful in talking about adaptation. The trait arises first... if it helps an organism live in an environment (and have offspring) then it is considered an adaptation. It doesn’t change so that it can adapt (see point about need)
- You can’t say “Camouflage was useful for the lions hiding in the grasslands, so it developed a fur pattern to help it hide”. You would have to say “Some lions were more camouflaged because of their coloring than others, and those who could hide HAD MORE OFFSPRING (differential reproduction) which resulted in the trait being passed on at a HIGHER INSTANCE (change in gene frequency) to the next generation.

Not considering that multiple mechanisms can be at play

- For natural selection or gene drift to occur, there must be genetic variation first (mutation, flow). However, once there is variation, BOTH can be happening at the same time. In a small population, you may have one allele that makes the organism better suited than another to survive and reproduce, but just by chance a different allele increases in the population. In this case, drift is having a bigger impact.

Assuming directionality

- Changes are not made because they are better. The change is made first, and then if it IS beneficial, it will most likely stick around due to Natural Selection. But in some instances, if Genetic Drift is having a bigger impact, the less beneficial type may increase instead!

- Evolution is not moving towards an endpoint. We are not the pinnacle! There are billions of types of bacteria that are SUPERBLY adapted to their environments. Complexity does not always mean better suited/Evolutionarily superior.

Using circular logic

- If we ask how homologous structures support/give evidence for Evolution, you cannot say because homologous structures come from a common ancestor. Common ancestry is part of the explanation (Evolution = theory = explanation!). It would be more accurate to say, “homologous structures have the same structure & organization and are developed in similar ways in these two organisms. This supports that they shared a common ancestor.”