Misconceptions about Adaptation

Words really do matter

People's ideas about natural selection, adaptation, and common ancestry are full of myths, misconceptions, and misunderstandings. Often, these false ideas come about because of the imprecise use of language, or because words can have multiple meanings.

Look at the myths below. Take some time to understand the reality. Then re-write each example so that it eliminates the myth and represents the reality.

Myth 1: *Only organisms that look alike share a common ancestor.*

Reality: All living things have DNA as genetic material, use the same code for building proteins, and share 200-300 fundamental genes. This is evidence that ALL life on earth is related through common ancestry.

Wrong example: It makes sense that polar bears and brown bears share a common ancestor, because they look alike. But not animals and plants—they look nothing alike.

Correct the example:

Myth 2: *Except for differences between male and female, and young and old, all individuals in a population are the same.*

Reality: Mutation and allele shuffling happen with each generation, continually increasing genetic variation. This is true in all populations, for all types of organisms.

Wrong example: Individual people or dogs are obviously genetically different. But the individuals in a school of fish or a flock of birds look exactly the same, so they must be genetically identical.

Correct the example:

Myth 3: *Populations adapt when all of the individual members gradually change their traits.*

Reality: Populations adapt when individuals that have certain traits are more likely to reproduce than individuals with different traits. Over multiple generations, the advantageous traits become more common in the offspring.

Wrong example: Giraffes grew longer necks so that they could reach higher leaves.

Correct the example:

Myth 4: *Natural selection can happen only when there are sudden changes to the environment.*

Reality: Natural selection happens all the time—for example, when the environment changes gradually, when a population moves into a new habitat, and even when the environment stays the same. Natural selection weeds out less-advantageous variations, and it favors any new variations that give an individual a reproductive advantage over its peers.

Wrong example: If the environment stays the same, a population won't adapt. It takes something like a new disease or a drought to kick natural selection into action.

Correct the example:

Myth 5: *Genetic variations arise in response to selective pressure.*

Reality: Genetic variations arise at random, all the time. Selection can act only on existing variations.

Wrong example: Because their habitat became icy and snowy, polar bears developed new genetic variations that gave them white fur that so that they could blend in.

Correct the example:

BONUS

Myth 6: *"Survival of the fittest" means that the strongest, fastest, fiercest individuals are the ones that get to reproduce.*

Reality: "Survival of the fittest" means that the individuals that are the most successful at surviving in their environment, obtaining limited resources, and reproducing are the most likely to pass their alleles to the next generation.

Wrong example: Individuals have to fight one another to get resources and find a mate, and the winners get to pass on their alleles.

Correct the example: