

How to argue evolution with creationists

The 2001 discovery of the seven million-year-old [Sahelanthropus](#), the first known upright ape-like creatures, was yet more proof of humanity's place among the great apes. And yet Mike Pence, then a representative and now US vice president, [argues](#) for the opposite conclusion.

For him, our ideas about our ancestors have changed, proving once more that evolution was a theory, and therefore we should be free to teach other theories alongside evolution in our classrooms.

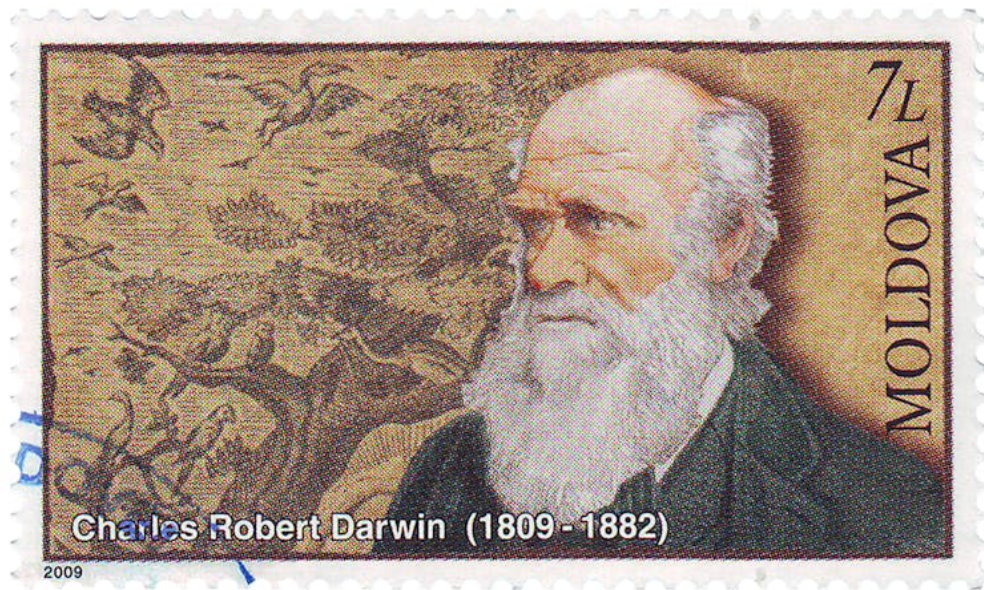
How to respond? The usual answer is that we should teach students the meaning of the word "[theory](#)" as used in science – that is, a hypothesis (or idea) that has been proved through repeated testing. Pence's argument will then be exposed to be what philosophers call an [equivocation](#)– an argument that only seems to make sense because the same word is being used in two different senses.

Just words

Evolution, Pence argues, is a theory, theories are uncertain, therefore evolution is uncertain. But evolution is a theory only in the scientific sense of the word. And in the words of the National Academy of Sciences, "The formal scientific definition of theory is quite different from the everyday meaning of the word. It refers to a comprehensive explanation of some aspect of nature that is supported by a vast body of evidence." Attaching this label to evolution is an indicator of strength, not weakness.

[The conversation](#) unknown

If you take this approach, you have failed to understand the purpose of Pence's rhetoric, or why it is so appealing to [creationists](#). Pence is an accomplished politician, and knows exactly how to appeal to his intended audience. He is also an accomplished trial lawyer, which makes him a conjuror with words, and like any skilful conjuror he has pulled off his trick by distraction. Pence has drawn us into a discussion about words, when our focus should be on the evidence.



Charles Darwin's *On The Origin of Species*, published in 1859, changed the way we look at the world. Shutterstock

I would suggest the opposite approach. The problem is not really with the word “theory” at all. Students will have learned its meaning in the same way they learn meanings in general: by seeing how the word is used.

They will have heard of atomic theory, which no one has seriously doubted for over a century. And what about the theory of gravity? Finally, they may have seen how Darwin himself uses the expression “my theory”, although at the time it was neither comprehensive nor well supported (there were huge gaps in the [fossil record](#)), to refer in a very general way to his linked ideas about [mutability of species](#), [common descent](#), and the power of [natural selection](#).

So if anyone says, “Evolution is a theory”, don’t give them a lecture on the meaning of the word “theory”. If you do, you’ve fallen into the trap of making it seem that how we define words should affect how we see reality. You will be fighting on ground of your opponent’s choosing, since arguing about how to apply words is the stock in trade of theologians, preachers and lawyers like Mike Pence.

The correct response is to say that evolution *is* a theory – like gravity is a theory – and then redirect attention to the evidence. And that evidence is overwhelming.

Evolutionary ammo

Start with family relationships. [Carl Linnaeus](#) showed how living things can be classified into species, genera, families and so on, and [Darwin pointed out](#) that this is exactly the structure we would expect from a family tree. All dogs are canines, so dogs share an ancestor with foxes; all canines are carnivora, so dogs share a more remote ancestor with bears; all carnivora are mammals, so dogs and sheep are, albeit

more remotely, related, and so on.

Then look at the discovery over the past few decades of family relationships at the molecular level, and the fact that the [molecular family tree](#) matches that based on anatomical resemblances.

Observe the [fossil record](#). Once lamentably full of gaps (Darwin was among the lamenters), it is now densely populated. A century ago, it still made sense to point to the “[missing link](#)” between humans and pre-human apes. Now we know of several different [hominin](#) species living alongside each other, and the problem becomes one of distinguishing our grandparents from our great uncles. And yes, there are missing links in the chain, but without evolution we would not have a chain at all.

And then there's [biogeography](#): for example, why marsupials are only found in South America and Australasia, and except for a few species that made their way across the Isthmus of Panama, are never found elsewhere.

Plus we can actually observe evolution, and study it in the field or in the lab. The emergence of pesticide resistance is evolution in action, as shown in the justly famous [Harvard/Technion demonstration](#) “evolution on a plate”. So is the delightful Russian experiment of [breeding tame foxes](#). Artificial selection, just as much as natural selection, is evolution in action.



Humans share 99% of their genes with chimpanzees, our closest relatives. Shutterstock

And finally, and most convincingly, we must look at the way that these different lines of evidence mesh together. We can apply biogeography to the fossil record, and link it to what we know about the movements of the continents. Using the methods of [molecular biology](#), we can identify and time the mutations that led different species to diverge from their common ancestor, and match the timing against

the fossil record.

Thus the fossil record, deep anatomical resemblances, and DNA evidence agree in showing that whales, for instance, are [closely related](#) to hoofed mammals, diverging from them in the [Eocene](#) period. There are many other examples of such consistency.

Then, and only then, pause to explain how a scientific theory is an interlocking connection of ideas that explain things about the world, and that evolution is one of the most successful examples. And challenge the Mike Pences of this world to spell out exactly what they would like to see taught alongside the Theory of Evolution – and why.

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