

## Evolution of species

### Worksheet Teacher's notes

1. Watch a short film on evolution of species : [http://www.youtube.com/watch?v=WI7ldMr\\_m5k](http://www.youtube.com/watch?v=WI7ldMr_m5k)
2. How do we know that evolution really happened?

Go to [http://darwin200.christs.cam.ac.uk/pages/index.php?page\\_id=j3](http://darwin200.christs.cam.ac.uk/pages/index.php?page_id=j3) and find out.

the answers are on the page, important: fossils and DNA

3. The evolution of species also can be applied to human species. Charles Darwin speculated that humans evolved from apes (not monkeys! do you know the difference?) and probably had the same ancestors. Watch a film about a missing link between ape and man: <http://www.youtube.com/watch?v=b1Ozky8xeFQ>

4. In the theory of evolution there are some key concepts. Go online, browse and try to explain:
  - Natural selection is Darwin's most famous theory; it states that evolutionary change comes through the production of variation in each generation and differential survival of individuals with different combinations of these variable characters. Individuals with characteristics which increase their probability of survival will have more opportunities to reproduce and their offspring will also benefit from the heritable, advantageous character. So over time these variants will spread through the population.

- the origin of species

<http://history1800s.about.com/od/scienceculture/a/darwin-on-origin-of-species.htm>

- adaptation

Adaptation is based on the concept that populations of organisms change over time as a result of natural selection. This happens when a collection of individuals in a population gain an advantage because of special traits that they share in common. These traits may be either inconspicuous or quite elaborate. They may, for example, start out as a 2 mm lengthening in the nectar-gathering tongue of a few moths that feed on orchids. If beneficial, over time the tongue may become much longer in that species as those individuals and their offspring out-reproduce others. Eventually the long shape becomes the norm, because the long-tongued adaptation, which allows more efficient feeding, contributes to an increase in reproductive success.

Darwin himself discovered an orchid with a huge, 11 inch long nectar-producing tube in Madagascar. He predicted that there would be a moth that feeds from the tube with an 11 inch proboscis. Almost 50 years later Darwin's prediction proved true when scientists discovered the moth *Xanthopan morgani praedicta* with a 12 inch proboscis which fed from, and pollinated, Darwin's orchid

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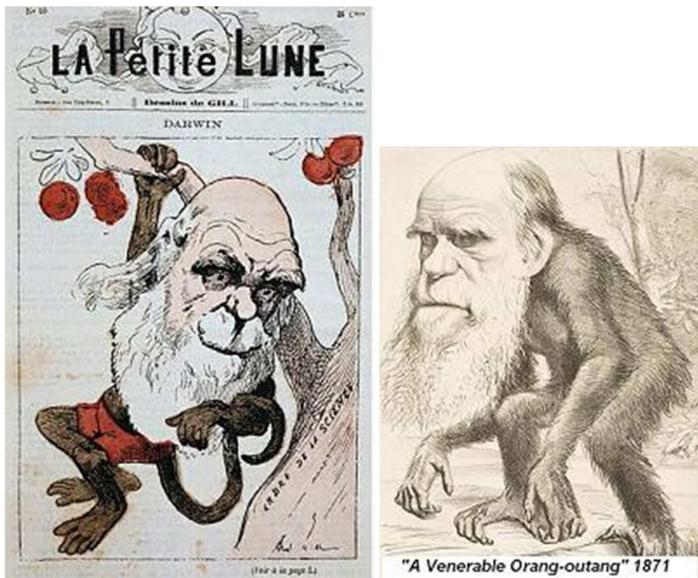
(*Angraecum sesquipedale*). Of course, the ultimate source of an adaptation like this, and all others, is genetic, because only traits that can be passed on from one generation to the next are influenced by natural selection.

Darwin's orchid-and-moth example is one of the more visible cases of adaptation. One feature of a plant is associated with a corresponding feature of an animal so that both benefit from their interconnected lives in nature. But more generally, organisms are amass of adaptations that come together to make a particular lifestyle work. Why? Because there are many factors in the environment that are "problems" that require "solutions." The availability of food, predator-prey relationships, and climate all play an important role in selecting "through natural selection" beneficial characteristics.

5. "It is not the strongest or the most intelligent who will survive but those who can best manage change." the quote attributed to Charles Darwin illustrates the importance of adaptation, change and mutation. Discuss.

students' own answers

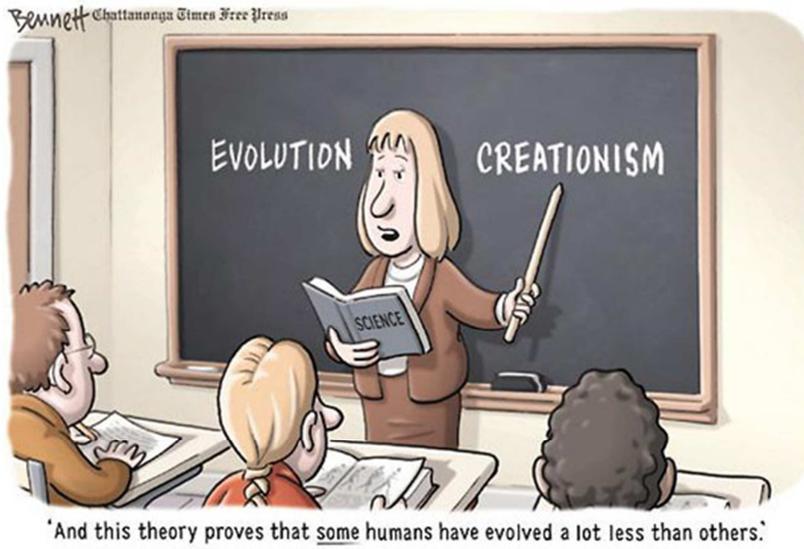
6. The theory of evolution met with much criticism. Can you guess why?



Even now there is a heated debate in the USA about the school curriculum and teaching of evolution and creationism. Can you guess the main arguments for both sides?

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students' own answers