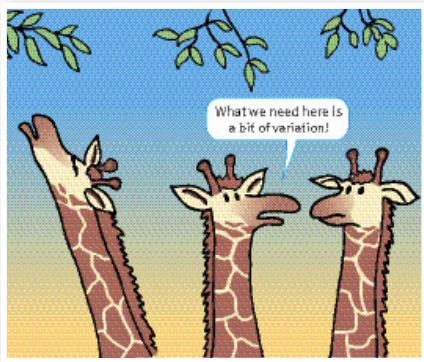


## Find out about

- ✓ **how new species are formed**



A mutation in a gene controlling fur colour produced tigers with white fur.



## Questions

- 1 Explain what a mutation is, and how it can happen.
- 2 What four processes combine to produce a new species?

## Key words

- ✓ **mutation**
- ✓ **reproductive isolation**

Charles Darwin's theory of evolution by natural selection predicts that new species will be formed from existing species and that other species will become extinct. These events usually happen slowly over many generations, which is why Darwin was not able to observe them happening. Since Darwin's time scientists have learnt a lot about DNA, and this has helped them to understand how new species form.

## Species show variation

We saw earlier (page 192) that a species is a group of organisms that can breed together to produce fertile offspring. They cannot reproduce successfully with members of different species. All the members of a species are not identical – there is variation.

## Mutations cause variation

Suppose that, when DNA is being copied, a mistake is made. This mutation could result in a different coloured flower, or spots on an animal's fur. Mutations happen naturally, and they are also caused by some chemicals or ionising radiation.

Mutations produce differences in a species. They are a cause of variation. This is very important for natural selection. Without variation, natural selection could not take place.

Most mutations have no effect on the plant or animal. Mutations that do have an effect are usually harmful. Very, very rarely a mutation causes a change that makes an organism better at surviving. If the mutation is in the organism's sex cells, it can be passed on to its offspring.

## Living in an uncertain world

If the environment changes then only some of the population will survive. By natural selection, only individuals with features that make them adapted to the new environment will survive.

## Living in splendid isolation

Populations that are isolated from each other have no contact with their neighbours. Organisms will be able to reproduce with other members of their own population, but will never meet organisms from other populations.

Sometimes variation might arise in one population that will prevent the organisms reproducing successfully with those from neighbouring populations, even if they were able to meet. This is called reproductive isolation. The isolated population has become a new species.

## Variety of life

It has been estimated that there could be over 30 million species on Earth. This huge variety of different animals, plants, fungi, algae, and microorganism species on Earth and the genetic variation within them is called biodiversity.

If new species are being formed, does it matter that some become extinct? Isn't extinction just part of life? Twenty-First Century Science put this question to Georgina Mace of the UK Zoological Society.



Georgina Mace

"It is true that species have always gone extinct. This is a natural process. But the pattern of extinction today is different from what has been recorded in the past.

- The rate of species extinction today is thousands of times higher than in the past.
- Current extinctions are almost all due to humans."

## Find out about

- ✓ **why it matters if species become extinct**
- ✓ **biodiversity and sustainability**

## Are humans to blame for some extinctions?

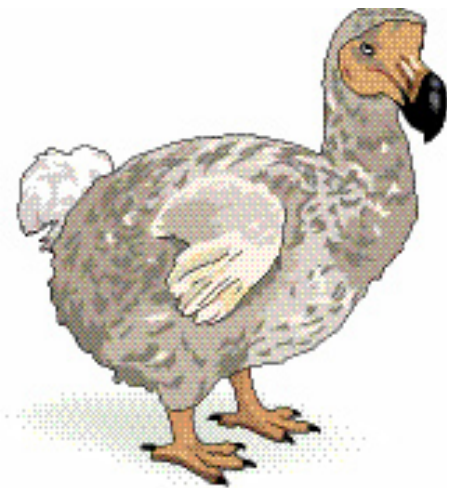
In 1598, Dutch sailors arrived on the island of Mauritius in the Indian Ocean. In the wooded areas along the coast they found fat, flightless birds that they called dodos. By 1700, all the dodos were dead. The species had become extinct. The popular belief is that sailors ate them all. But this explanation appears too simple. Written reports from the time suggest that they were not very nice to eat.

### What killed the dodos?

Humans may not have eaten dodos. But did they cause their extinction without meaning to? When the sailors arrived, they brought with them rats, cats, and dogs. These may have attacked the dodos' chicks or eaten their eggs. The sailors also cut down trees to make space for their houses. Maybe this took away the dodos' habitat.

So human beings can cause other species to become extinct:

- directly, for example by hunting
- indirectly, for example by taking away their habitat or bringing other species into the habitat.



Dodos were not able to survive the changes in their environment. This is a disaster for any species.