

## Find out about

- ✓ how new species are formed



A mutation in gene controlling fur makes some tigers have white fur.

## Questions

- 1 Explain what a mutation is.
- 2 What can cause a mutation?

The theory of evolution by natural selection predicts that:

- new species will be formed from existing species
- other species will become extinct.

These events usually happen very slowly. It takes many generations for a new species to form. This is why Darwin was not able to see this happening. Since Darwin's time, scientists have learned a lot about DNA. This has helped them to understand how new species are formed.

## Species show variation

At the beginning of this module you saw that a species is a group of organisms that can breed together. Their offspring are fertile. They cannot reproduce successfully with members of different species.

The members of a species are not identical. There is variation.

## Mutations

When DNA is copied, sometimes a mistake is made. This is a mutation. A mutation might give different coloured flowers or spots on an animal's fur. Mutations happen naturally. They are also caused by some chemicals and ionising radiation.

## Mutations cause variation

Mutations produce differences in a species. They cause variation. This is very important for natural selection.

Most mutations have no effect on the plant or animal. They don't harm them or help them survive. Some mutations are 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 environment

Environments change. When this happens only some of the population will survive. Some individuals will have features that are better suited to the new environment than others. These are better adapted and will survive.

## Living in splendid isolation

Some populations are isolated from each other. They have no contact with their neighbours. Organisms will be able to reproduce with other members of their own population. But they will never meet organisms from other populations.

Sometimes one population changes. This will prevent them from reproducing successfully with organisms from populations nearby, even if they met. This is called **reproductive isolation**. The isolated population has become a new species.

Lake Malawi is in East Africa. It contains over 2000 species of brightly coloured cichlid fish. Recently scientists studied their DNA. This DNA evidence showed that they evolved from a single species of fish.

This fish species entered the lake about 1.5 million years ago. This is a long time ago. But for evolution it is very quick.

The populations of cichlids live in the same lake. But they are isolated. This is because different parts of the lake have very different conditions. These differences isolate the populations from each other. If the different species meet they cannot reproduce successfully.

### Question

- 3 What three processes combine to produce a new species?



Cichlid fish from Lake Malawi in East Africa.

### Summary box

- ✓ New species form when their environment changes. This happens because of natural selection and reproductive isolation.
- ✓ Mutations are changes in the DNA of a gene.
- ✓ Mutation causes variation in a species.