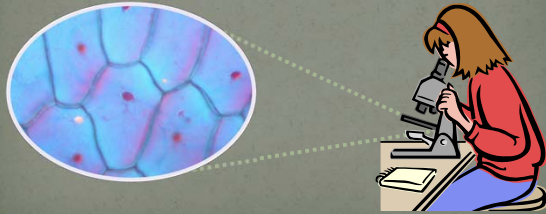


# What causes evolution?

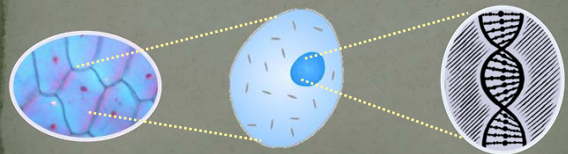
Living things are made of tiny building blocks called cells.



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# What causes evolution?

Inside each cell is a code called DNA – deoxyribonucleic acid (de-oxy-ribo-nu-cle-ic acid). DNA is like a blueprint – a plan for building the complete living thing (also called an organism).



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# What causes evolution?

When living things produce offspring the DNA code from the male and the female is split and shared with the new offspring. This is why the offspring is never completely identical to its parents as it only receives half of each code telling it how to build itself!

There are some exceptions to this as some living things do not require a male and a female to reproduce and their offspring are clones – identical to the parent.



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# What causes evolution?

An easy way to think about this is to consider how people breed different kinds of dogs to mix together the DNA and create new types. For example, a labrador + a poodle creates a new breed called a labradoodle!



This process is called **inheritance**. The new dog **inherits** DNA from the two parents. This is why you might resemble one or both of your parents!

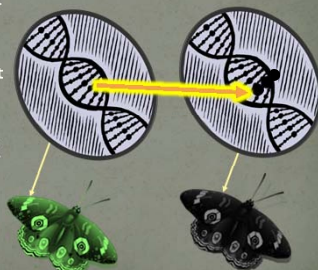
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# What causes evolution?

Sometimes the DNA blueprint code becomes a bit mixed up or damaged. These tiny changes in the plan can result in living things changing.

Here a green moth has changed to a darker coloured one. This could be an advantage or a problem...

Can you think why?



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# What causes evolution?

Sometimes these changes are bad ones and that specific living thing does not survive, meaning it never gets to create offspring just like itself. This process is called **Natural Selection**. It is as if nature is selecting some of the species to survive and others to become extinct. Some also call it **survival of the fittest**.

Think back to the moth... it likes to find food on large green leaves. Before it changed it was green and was hardly visible to predators, like this robin. It is more likely to survive to create offspring! However...



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# What causes evolution?

The black moth is now a contrasting colour to the leaf. The way it changed has made it far more visible to predators. It is unlikely to survive to create offspring!

This change is part of a long evolutionary process and is called an **adaptation**. Eventually a living thing adapts to become so different that it evolves into a completely new type of life.

Look back...

After...



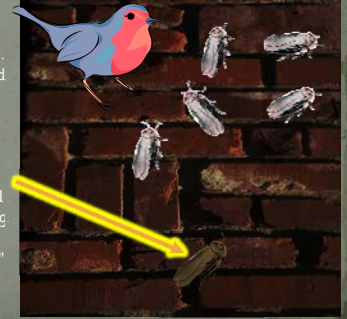
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# What causes evolution?

But sometimes the changed DNA gives the organism an advantage. It grows and reproduces offspring. Inside the cells, the DNA is passed on to the offspring. The new advantage is copied over. For example, when the buildings in a city became black with pollution this beetle's lucky DNA change made it more likely to survive and have other dark coloured offspring. The adaptation was a chance of nature but this one was "selected" to survive because it suited its changing environment better.



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# What causes evolution?

Over millions of years, these tiny successful adaptations build and build, creating new types of living thing. Rarely, other violent forces of nature wipe out life forms, such as when an asteroid hit the Earth 65 million years ago. This upset to the tree of life allows other new life forms to adapt and flourish. Do you think humans would have evolved if the dinosaurs had **not** been made extinct?



3 1/2 billion years ago (y.a.)  
Single-celled life: bacteria



450-420 million y.a.  
larger animals and plants



225 m.y.a.  
dinosaurs



140 m.y.a.  
flowers



130,000 y.a.  
humans

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