



EVOLUTION

WORDS

- **amphibian** = an animal that can live on land and in water
- **ancestor** = a member of a species that lived a long time ago
- **ancient** = old
- **appear** = can be seen
- **branch** = part of a tree that grows out of it
- **certain** = special
- **claw** = a sharp curved nail of an animal
- **clay** = a heavy kind of earth that is used for making pots and bricks
- **common** = here: the same
- **connect** = join together
- **contain** = have
- **evidence** = same as "proof"
- **evolve** = grow out of ...
- **features** = a part of something that you see because it is important or interesting
- **fin** = one of the thin body parts that a fish uses for swimming
- **forearm** = the part of the arm between the hand and the elbow
- **fossil** = an animal or plant that lived a long time ago. You can see its shape or form in rocks
- **however** = but
- **human beings** = people
- **layer** = level
- **leftover** = what is left of something
- **limb** = an arm or a leg
- **lizard** = a kind of reptile that has four legs and a long tail
- **mammal** = an animal that drinks milk from its mother
- **mushroom** = a plant that grows in the forest; it has a stem and a round top and can be eaten
- **proof** = information that shows that something is true
- **related** = connected
- **reptile** = an animal like a snake whose body temperature changes when it is hot or cold. It lays eggs to have babies
- **scale** = one of the small flat pieces of skin that covers the body of a fish
- **scientist** = a person who is trained in science
- **share** = to have together
- **similar** = almost the same
- **skeleton** = all the bones of the human body
- **species** = a group of animals that are like each other and can have babies together
- **take place** = happen
- **wrist** = where your hand and your arm get together

Why do **human beings** look a bit like monkey or apes? Why are dolphins good swimmers? Why do giraffes have long necks? The answer to all these questions is evolution. Evolution is the way life changes through time.

All living things are **connected** together like **branches** in a tree. Plants and animals are **related** to one another through their **ancestors**. For example, we **share a common ancestor** with gorillas, dogs or even **mushrooms**.

Evolution shows us how and why all living things change over a certain period of time.

EVIDENCE OF EVOLUTION

We cannot watch changes in life directly. They **take place** over thousands or millions of years. **However**, **scientists** cannot find **proof** that these changes have taken place.

Important **evidence** for evolution comes from **fossils**, the **leftovers** of **ancient** life. When animals or plants die they are pressed into sand or **clay**. Over millions of years rocks are formed.

Scientists have found out that different **fossils** are found in rocks of different ages. For example, the oldest rocks of our earth are about 3.8 billion years old. They **contain** no **fossils** because there was probably no life at that time. **Fossils** of bacteria **appear** in rocks that are about 3.5 billion years old. Fish, **reptile** and **mammal fossils appear** in younger rocks. Human fossils are found only in the youngest and highest rock **layers**.



Fossils also show that **certain** groups of animals have **evolved** from other groups. **Amphibians evolved** from fish that could breathe air and move on land. They had legs but also **scales** and a **fin**.



Birds probably **evolved** from dinosaurs. The Archaeopteryx was an animal that had feathers like a bird and could fly. It also had teeth, **claws** on its wings and a **skeleton** that looked like a meat-eating dinosaur.

But even without **fossils** there is other **proof** which shows that evolution has taken place. Different **species** often have **similar features** which they probably got from a **common ancestor**. For example the front **limbs** of **lizards**, birds, bats and humans are very much alike. They have one bone in the upper arm, two in the **forearm**, **wrist** bones and five fingers.

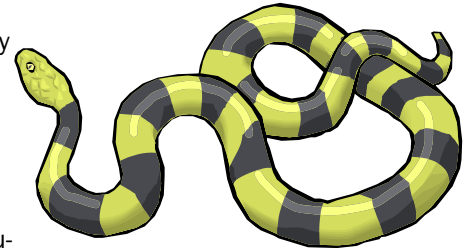


EVOLUTION

WORDS

- **advantages** = something that helps you to be better than others
- **ancestor** = a member of a species that lived a long time ago
- **appendix** = a small organ near your stomach, which we do not really need
- **average** = normally, usually
- **beak** = the hard pointed mouth of a bird
- **biologist** = someone who studies plants, animals, nature
- **certain** = special
- **characteristics** = features
- **compete** = fight for
- **drought** = a time when it is very dry with little or no rain
- **evidence** = information that shows that something is true
- **features** = a part of something that you see because it is important or interesting
- **finch** = a small bird with a short beak
- **human beings** = people
- **individual** = a single animal or person
- **inherit** = to get something from someone
- **mainland** = the main area of land that a country has; not the islands
- **pass on to** = to give to your children
- **observe** = see, find out
- **occur** = to happen
- **remains** = what is left over
- **scarce** = if there is not enough of something
- **seed** = a small hard object from a plant; a new plant can grow out of it
- **similar** = almost the same
- **species** = a group of animals that are like each other and can have babies together
- **structure** = the way parts of the body are connected to each other
- **survive** = to live on after a dangerous situation
- **useless** = you don't need it any more
- **whole** = all of

Living creatures might also have **structures** that they have **inherited** from an **ancestor** but have become **useless**. They don't need them any more. Pythons, for example, have the **remains** of back leg bones, but snakes do not have such legs. The **appendix** was used by animals that ate only plants but in our bodies these organs have become **useless**.



The way in which different **species occur** all over the world also gives us **evidence** for evolution. **Similar species**, for example, are found together in **certain** areas. All types of kangaroos are found in Australia. This is because the kangaroos' **ancestors** also lived there. Plants and animals do not always live in ideal places. Tropical ocean islands, for example, are ideal places for frogs to live, but no frogs are found there. This is because the frogs' **ancestors** lived on the **mainland** and could not get to ocean islands far away.

HOW EVOLUTION HAPPENS

NATURAL SELECTION

Although we are all **human beings**, each one of us is different. We all belong to the same **species** but there are never two people on earth who are exactly the same. We are like our parents because we **inherit certain features** from them.

Because there is not always enough food for animals and plants to eat they **compete** against each other in order to **survive**. Some **individuals** are better than others because they have **certain advantages**. On **average**, those that are better or stronger will **survive**. The **advantages** that they have are then **passed on** to their children and as time goes on these **characteristics** will be **passed on** to the **whole species**. We call this natural selection.

Example: In 1977 no rain fell on the Galapagos Islands. Food became very **scarce** and many of the island's **finches** died. They normally ate small **seeds** that were lying on the ground. **Biologists observed** that **finches** with larger **beaks** were able to **survive** because they could eat larger and harder **seeds** that **finches** with smaller **beaks** couldn't open. In the fight for food large-beaked birds had a great **advantage**. After the **drought** ended **biologists** found out that the next generations of **finches** were larger than the ones before.



EVOLUTION

WORDS

- **adaptation** = changing something so that it can get used to a new situation
- **adapted to** = to get used to
- **as a result** = that is why ...
- **advantage** = something that helps you to be better than others
- **ancient** = old
- **beak** = the hard pointed mouth of a bird
- **by accident** = in a way that is not planned
- **cause** = lead to
- **certain** = special
- **develop** = grow
- **divide** = to split up into two or more parts
- **enemy** = animals that hate you and want to harm you
- **eruption** = outbreak
- **features** = a part of something that you see because it is important or interesting
- **flood** = when water covers land
- **fur** = the thick soft hair that covers the bodies of animals
- **gene** = a part of a cell of a living thing that controls what it looks like, how it grows .
- **genetic** = everything that is about genes
- **habitat** = place to live
- **inheritance** = the features and characteristics you get from your family
- **mammal** = an animal that drinks milk from its mother
- **migrate** = to go to another place to live there
- **mutation** = when the genetic code changes so that it makes an animal or plant different from others
- **natural disaster** = something that suddenly happens in nature like a storm or a flood and kills people and animals
- **population** = all of the animals of the same species that live in a place
- **reach** = get to
- **related** = connected
- **scientist** = a person who is trained in science
- **separated** = not together any more
- **set** = group of things
- **similar** = almost the same
- **single** = only one
- **species** = a group of animals that are like each other and can have babies together
- **sperm** = a male cell that can join with a female cell and produce new life
- **store** = to save
- **structure** = how things are arranged or placed
- **whole** = all of

GENETICS AND INHERITANCE

Today, **scientists** know that a molecule called DNA has all the information which controls the way life will **develop**.

This information is **stored** in **genes** and the **structure** of **genes** is called the genetic code.



When a male and female have children the male **sperm** and the female egg join together to a **single** cell with two genetic codes, one **set** from the mother and one **set** from the father. A baby then **develops** from this cell. This is how we get **certain features** from our parents.

Sometimes parts of the genetic code change **by accident**. We call this **mutation**. Some mutations in **genes** are dangerous, others may be an **advantage**. In the example of the birds, the larger **beaks** were a **mutation** that was good for the **whole species**.

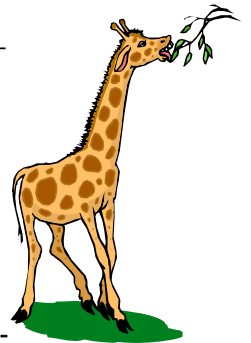
ADAPTATION

Sometimes animals and plants fit beautifully into the world around them. The Arctic fox, for example, is **adapted to** the polar ice in the far north. It has a thick **fur** that helps it stay warm and the white colour makes it harder for **enemies** to see. With its hairy feet it can walk more easily in the snow.

Giraffes also got used to the world they live in. **Ancient** giraffes normally did not have long necks, but those that did were able to find more food because they could **reach** the leaves of the trees.

Longer-necked giraffes had more babies than others and **as a result** they **developed** into the tallest land animals in the world.

Adaptations can **cause** plants or animals to look alike even if they are not closely **related**. The bodies of sharks and dolphins are **similar**, but the shark is a fish and the dolphin a **mammal**.



SPECIATION

Speciation happens when one **species divides** itself into two or more new **species**. This happens, for example, when the same group of animals or plants live in different places. Sometimes **species migrate** to new **habitats**. In other cases a **population** may be divided by **natural disasters** like **floods** or volcanic **eruptions**.

When **species** are **separated** they don't have contact with each other any more and they **develop** in separate ways. As time goes on the two groups become more and more different, simply because they live in different **habitats** maybe with more or less food or a hotter or cooler climate. If they get together again they cannot have babies any more because they are completely different.



EVOLUTION

WORDS

- **accept** = to agree to, to say yes
- **although** =while
- **brain** = the organ inside your head that controls how you move, think and feel
- **cause** =lead to
- **change** = if something becomes different
- **claim** = to say that something is true even if you do not know it
- **connection** =link, relationship
- **decade** = a period of ten years
- **develop** = grow
- **environment** = the world around us
- **extinct** = a type of animal or plant that does not live any more
- **evolve** = grow out of ...
- **fit** =here: to live in a better way
- **fossil** = an animal or plant that lived a long time ago. You can see its shape or form in rocks
- **Homo Sapiens** = the type of human that exists today
- **insecticide** = chemicals that are used for killing insects
- **invite** =to ask to come with someone
- **natural selection** = when only those animals and plants survive that can best live in the world around them ; all the others die out
- **notice** = see
- **occur** = to happen
- **offspring** = children, babies of animals
- **origin** = where something comes from
- **primate** = a member of a group of animals that monkeys and humans belong to
- **publish** = to print a book so that it can be sold
- **sail** = travel on a ship
- **scientist** =a person who is trained in science
- **species** = a group of animals that are like each other and can have babies together
- **survive** =to live on after a dangerous situation
- **upright** = stand straight
- **voyage** = a long trip on a ship

SPEED OF EVOLUTION

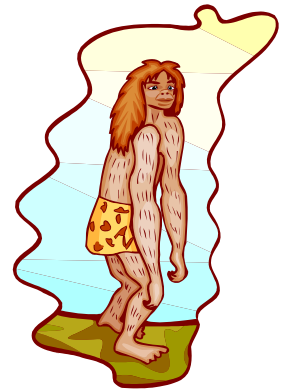


How fast does evolution happen ? Sometimes it **occurs** very quickly. In only a few **decades** insects **evolved** that were able to **survive insecticides**. Viruses also **develop** quickly. The AIDS virus was unknown before the 1980s.

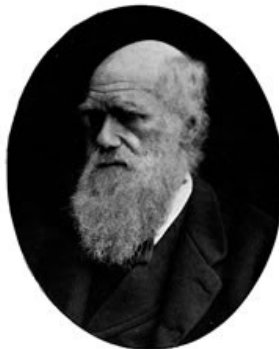
Some animals **evolve** very slowly for millions of years and then **change occurs** very quickly.

HUMAN EVOLUTION

Fossils show that many **species** which are now **extinct** belong to the same family as we humans do—**Homo Sapiens**. The oldest members of this family are **primates** that lived in Africa a few million years ago. They were able to walk **upright** and had a **brain** that was a bit bigger than that of an ape.



CHARLES DARWIN



Charles Darwin was an English **scientist** who studied nature. In his famous book "On the **Origin** of Species " he **claimed** that all living plants and animals **developed** from earlier forms of life.

Darwin was born in England in 1809 . His father was a doctor and his mother died when he was 8 years old. **Although** Darwin was interested in nature, he was sent to a university to study medicine, but he didn't do well there.

In 1831 Charles Darwin was **invited** to **sail** on the HMS Beagle to study natural history. The **voyage** lasted for five years and took Darwin to the Galapagos Islands and other places on the western coast of South America. There he studied **fossils** in old rocks and **noticed** that there was a **connection** between them and plant and animal life. As time went on he **developed** his theory of **natural selection**. Those plants and animals that **fit** better into their **environment** can **survive** better and produce more **offspring**.

When his book was **published** it **caused** a lot of discussion but in a short time it was **accepted** by **scientists** around the world.