

## Curriculum links

These notes accompanying the fossils box can be linked to support several curriculum areas for primary age groups.

### The key curriculum areas in England & Wales

**Geography** - enquiry skills and knowledge and understanding of places, patterns and process and environmental change and sustainable development

- breadth of study to local environment and fieldwork investigations

**Science** - enquiry and investigative skills

- materials and their properties, classifying, changing materials, useful products, and separating materials

- physical processes, forces and motion

### The key curriculum areas in Scotland

#### Environmental studies:

- **Society** - enquiry skills, knowledge and understanding of people and physical environment and interaction

- **Science** - investigating skills, knowledge and understanding of earth and space, materials from the earth and changing materials

- energy and forces – properties and uses of energy and forces and effects



BPES has a range of other resources. For your free catalogue please contact us at:

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Alternatively, visit our website at **[www.bpes.com](http://www.bpes.com)**

#### Acknowledgments

Grateful thanks are extended to Peter Kennett and the Earth Science Teachers' Association (ESTA). ESTA publishes a quarterly activity sheet for primary teachers and can be contacted at: ESTA, c/o The Geological Society, Burlington House, London W1V 0JU. Website: **[esta-uk.org](http://esta-uk.org)**

BP is a member of the U.K. Offshore Operators' Association (UKOOA). UKOOA supports the Earth Science Education Unit which exists to provide Earth Science INSET in both primary and secondary schools and teacher education institutions throughout the country. The workshops all involve practical and investigative work. Such INSET is free apart from the travel costs of your local ESEU facilitator. For further information please contact Bernadette Callan: [eseu@keele.ac.uk](mailto:eseu@keele.ac.uk), tel: 01782 584 437 web: **[www.earthscienceeducation.com](http://www.earthscienceeducation.com)**

The website **[www.jesei.org](http://www.jesei.org)** is compiled by teachers of physics, biology and chemistry, with ESTA advice, and contains many ideas for practical and investigative work in Earth Science.

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# fossil samples

## primary teacher's notes



## Fossils

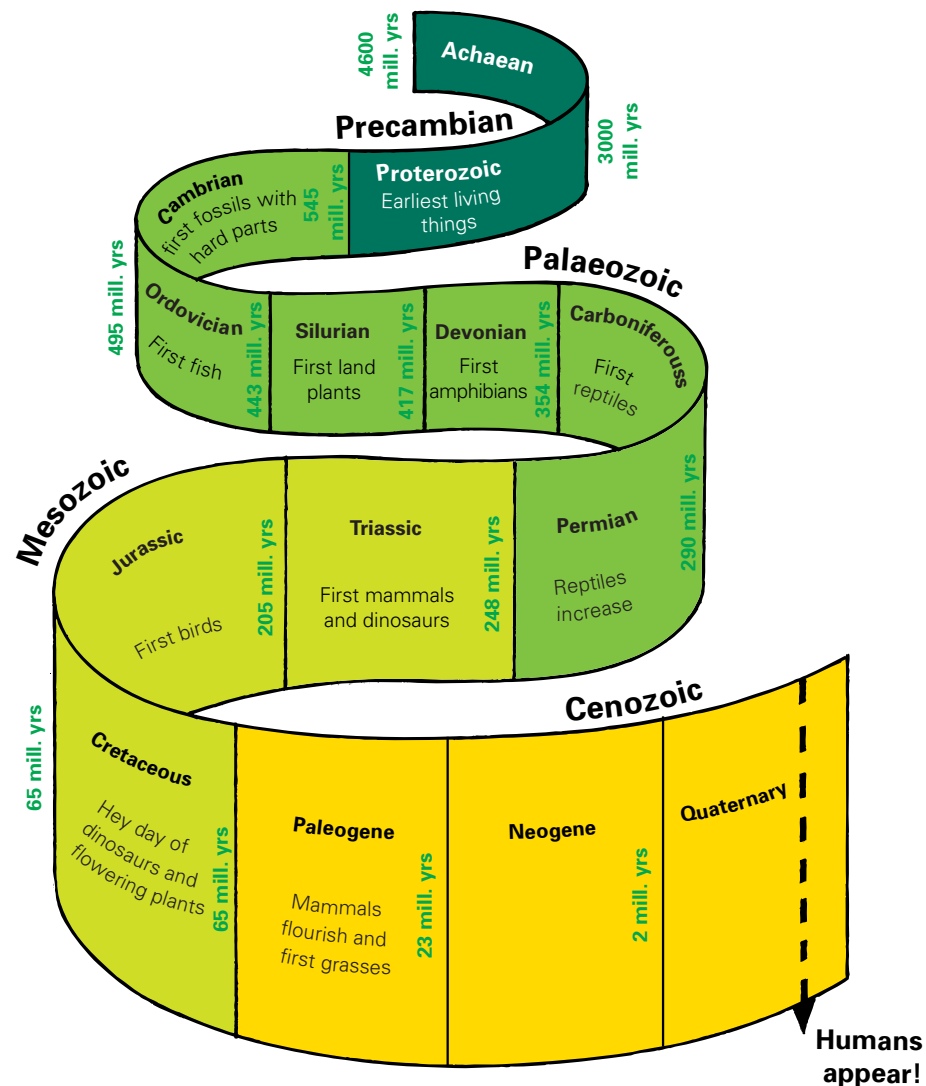
**Fossils are remains or traces, of plants and animals that have lived a long time ago but have been preserved naturally. To be classified as a 'fossil' it normally needs to be at least ten thousand years old. Some of the oldest fossils found are 600 million years old!**

Fossils can range from tiny plants and animals that can only be seen with a microscope, to just a trace of the animal (like a footprint), to a part of an animal or plant (usually the hard parts such as shell, bone, teeth or wood) – right up to the whole skeleton.

Most fossils are found in sedimentary rock (see difficult words explained at back of the book) where over millions of years, the once living organism has been changed into rock. But animals and plants have also been preserved in peat, tar, ice or resin (amber) of ancient trees.

People have been fascinated by fossils for many years. They have an important role in our lives as by studying them we can learn about the past and how life has evolved on Earth.

## The Earth Timeline



## Did you know?

Fossil collecting can be a great hobby! Many can be found washed up on sea shores, but remember safety is a must; always get permission and always tell someone where you are going!

### KEY

- Precambrian
- Palaeozoic
- Mesozoic
- Cenozoic

## How are fossils formed?

There are four main ways fossils are formed:

### 1. From the hard parts of animals

As living things die they rot and decay. Hard parts such as bones, teeth or shells don't decay easily and can last a long time when they are buried by layers of sediment (sand or mud etc).

As they eventually decay they are replaced by minerals and become a rock-like copy. Although the sediments around them also become rock (sedimentary rock) the 'fossils' are quite distinct in the rock.

Most fossils are formed this way and discovered when the rock is dug up.

### 2. From the soft parts of animals or plants

This is a much rarer way for fossils to form but sometimes the soft parts don't decay quickly, but gradually become 'petrified' (turned to stone). The best examples of this are when branches or even whole tree trunks have been replaced by minerals and turned into rock, but looking like wood!



example of petrification



### Did you know?

'Living fossils' are plants and animals which are found alive today, even though scientists thought they had died out millions of years ago.

### 3. From traces of animals or plants

Sometimes no part of the animal or plant remains as a fossil, but we know they were there by the evidence they leave behind – footprints, tracks or marks.

Sometimes the original living thing, as it is buried in the layers of sediment, does decay or dissolve and just leaves its impression. These impressions are called fossil moulds (if they are filled with new material they are called fossil casts).

A gruesome example of this is where a violent volcanic eruption covered the ancient town of Pompeii, covering the bodies of people with ash – the bodies decayed leaving a mould of them in the hardened rock.

### 4. Where no decay happens

This is always an exciting discovery – when the whole original plant or animal is preserved and protected. It can happen in several ways but always means no decay.



**In amber** – insects got stuck in the sticky resin that oozed from ancient trees. This covered them completely, keeping out the air and gradually this resin hardened and fossilised keeping the insects preserved whole in a clear yellow substance.

**In ice** – we know that ice can preserve food in a freezer. Some prehistoric animals were covered by ice as they died which kept them preserved for thousands of years. A whole woolly mammoth was found in a glacier.

**In bogs** – in water logged, muddy bogs decay is prevented. Besides plant and animal remains being preserved, human bodies from thousands of years ago have been found in deep Irish peat bogs. They were squashed, but their skin and hair were preserved.

## Dinosaur fossils

Thanks to fossils, we are able to study plants and animals that lived years ago and are now extinct!

No one has ever seen a real dinosaur, because they lived, then became extinct well before humans existed.

Over the years, complete skeletons, bones, footprints, even eggs with fossilised baby dinosaurs inside, have been found. From these discoveries, we can build up a picture of what they looked like, how they moved, even what they ate. Probably the only thing we can't say for sure is their colour, but we can make a guess based on present day reptiles.

**The mystery remained though – how did they die out? Was it a huge meteorite crashing to Earth, a change in climate or a change in vegetation? What do you think?**



### Did you know?

In 1841, a British scientist, Sir Richard Owen invented the name 'dinosaur' which in Greek means 'terrible lizard'.

## Fossil fuels

**Fossil fuels are not fossils. They are really stores of energy formed from the remains of plants and animals that lived millions of years ago.**

The fossil fuels we use today such as coal, oil and gas take millions of years to form and cannot be replaced easily. These are called 'non-renewable sources of energy'.

Our supplies of fossil fuels will not last forever; so many scientists are trying to develop other sources of energy – renewable sources such as solar, wind or water, before the fossil fuels run out.

**Coal** – started out as vegetation in swampy forests around 300 million years ago. Branches, leaves, seeds, roots all began to rot, gradually being buried under layers of sediments. Pressure and heat changed them first into peat then into coal. Oil and natural gas are together known as 'petroleum' this comes from the Latin words petro (rock) and oleum (oil).



### Did you know?

Fossil fuels are burnt to give us energy to run many of our machines and give us heat for warmth and cooking. Oil is also used in the manufacture of many materials – including plastic.

## Suggested activities

- Use secondary sources to find out more and produce a fossil fact file
- Make your own timeline chart
- Investigate your local area
- Visit the Natural History Museum
- Use hand lenses to observe and sketch some of the fossil samples
- Match some of the fossils to plants or animals living today
- Make your own 'fossil' from a sea shell:
  - choose different shaped shells
  - indent, impress the shell into modelling clay (explain that this leaves an impression of the original shell – a mould)
  - mix small quantities of plaster with water and gently pour into the mould
  - leave to set and harden (explain this is how fossil casts are formed when new material fills the moulds)
  - carefully lift out the plaster cast and paint to match the original.
- Make your own fossil from a plant:
  - choose a piece of rock with a flat surface, (or make your own from plaster)
  - brush black paint on one side of a fern leaf
  - place the leaf (point side down) onto the flat surface of the rock
  - with a folded sheet of newspaper, press down firmly and hold still for a few seconds
  - carefully remove the newspaper
  - peel off the fern leaf and you should be left with a black 'trace' of the leaf on the rock
  - leave it to dry
  - varnish the flat side of the stone, let it dry and then varnish the rest.

## Discussion, debate and questions

- Look at a piece of shelly limestone and discuss why some of the fossils are broken up – think of a day at the seaside with the waves crashing up the shingle
- What is a fossil?
- How old can a fossil be?
- How can fossils tell us about the past?
- Describe how fossils are formed from hard parts of animals
- What does petrified mean?
- What does a trace fossil mean?
- Describe how whole insects have been fossilised into amber
- What does the word 'dinosaur' mean?
- Name three fossil fuels
- How are fossil fuels formed?
- Name three things fossil fuels are used for
- What does non-renewable energy source mean?
- Discuss some of the theories as to why dinosaurs died out
- Find out the name given to someone who studies fossils
- The coelacanth fish is known as a 'living fossil'. Why?

**To find out more about the rocks in which fossils are found, see our rocks box. Visit [www.bpes.com](http://www.bpes.com) for more information.**

## Difficult words explained



amber



dinosaur



fossil



lava

### Amber

A yellowy – brown liquid resin from trees that has hardened and many contain fossils

### Decay

To go rotten

### Dinosaur

An extinct prehistoric giant reptile

### Distinct

Easily recognisable, different from things around it

### Energy

The power to make things work

### Evolve

To change very gradually over a long period of time

### Extinct

Plants or animals that have died out completely and no longer exist (an extinct volcano has stopped erupting a long time ago)

### Fossil

The remains or traces of plants or animals that have been preserved in the Earth's crust

### Fossil fuel

Stores of energy formed from the remains of plants and animals that were alive millions of years ago

### Lava

Hot liquid rock that comes out of an erupting volcano and becomes solid as it cools

### Living fossils

The real living animal or plant discovered when we thought all had died out and only the 'fossil' evidence remained

### Meteorite

A small piece of matter from space, falling to Earth

### Minerals

The most common solid materials found on Earth – regular mixtures of chemicals

### Non-renewable

Non renewable energy sources are not replaced as we use them so they will eventually run out

### Organism

Any living thing

### Petrified

Turned into 'stone'

### Porous

Material that can soak up liquids or gases

### Prevented

Stopped from happening or existing

### Preserved

To keep something as it is, stop it being lost or destroyed

### Renewable

Able to be renewed or replaced by natural processes

### Resin

A sticky liquid that comes out of the trees

### Sedimentary rock

Rock formed when layers of sediment have squeezed together, water has been pressed out and the sediments have stuck together

### Skeleton

The frame of bones inside the body

### Trace

A mark or sign that has been left behind by the plant or animal

### Vegetation

Plant life or the total plant cover of an area



a crater created by a meteorite



petrified fern fossil



sedimentary rocks



skeleton



vegetation