

A time-line in your own backyard

Hang pictures of the important events in the history of life on a string time-line

Pupils are told that the string represents the 4600 million years since the Earth was formed and which end represents the present day.

Ask the pupils to lay out the pictures in the order in which they think the organisms first appeared in the geological record. They then peg the events on to the string at the time when they think the organism first appeared.

Show them a correct, completed string and ask them how it compares to theirs.

Ask the pupils to consider:

- which events were difficult to place on the timeline?
- what can they say about the order in which the events occurred? Is it surprising?
- humans, or their near ancestors, have existed for 2 million years, while bacteria have been found in rocks of 3500 million years age and are still abundant today. Will either still be living in 3500 million years from now?

Here is a chant about the history of life on Earth.
Can your pupils do better?

*Earth and meteorites, volcanoes then sea,
Single-celled life then came to be.
Animals with shells, then fish in the sea,
Land plants, amphibians came next, you see.
Reptiles, dinosaurs, mammals came along,
Birds flew in the sky with their new song.
Plants with flowers, then grasses were next to be
Then us, humans, you and me.*



A time-line in your own backyard
Photo by Peter Kennett

The back up:

Title: A time-line in your own backyard

Subtitle: Hang pictures of the important events in the history of life on a string time-line

Topic: This activity can be used in a lesson about the history of life on Earth or when discussing the fossil record or geological time.

Age range of pupils: 12 - 18 years

Time needed to complete activity: 20 minutes

Pupil learning outcomes: Pupils can

- describe the history of life on Earth;
- appreciate how the fossil record provides evidence for the increasing complexity of organisms;
- appreciate the great length of the timescale within which evolution operates;
- explain that humans appeared very recently in geological terms.

Context: The fossil record tells us when different groups of organisms were first discovered.

The table below provides dates and distances for 4-6 metres long piece of string (1 million years = 1mm)

Event	Millions of years ago (Ma)	Distance from 'present day' (cm)
First humans (genus <i>Homo</i>)	2	0.2
First flowering plants	130	13
First birds	150	15
First mammals	220	22
First dinosaurs	225	22.5
First reptiles	325	32.5
First amphibians	360	36
First plants and animals on land	420	42
First animals with hard parts	545	54.5
First multicellular organisms	1200	120
First eukaryotes	2000	200
First bacteria	3500	350

Following up the activity: The concept of 'deep time' (geological timescale) can be shown in many ways, for example by marking the major divisions on the ground, on a paper roll - even marking the divisions on a toilet roll, or dividing 24 hours of a day as equivalent to the age of the Earth.

Underlying principles:

- the fossil record provides evidence for the evolution of life on Earth
- the sequence of life of Earth, i.e. the order of appearance of different groups of organisms, was determined from the fossil record, using relative dating methods
- after the sequence was determined, scientists had little idea of how long this evolutionary sequence had taken to develop
- the rocks containing some fossils can now be dated by absolute radiometric dating methods which are becoming more accurate all the time. This means that we can now add figures to the timescale.

Thinking skill development:

- understanding the pattern of increasing complexity of organisms (construction).
- deciding the correct order of appearance of organisms in the geological record (cognitive conflict).
- reasoning behind the final sequence (metacognition).
- the fossil record provides evidence for evolution and tells the history of life on Earth (bridging).

Resource list:

- twelve pictures of organisms (A5 size or less), each representing an important event in the history of life (*suitable pictures can be found on the Internet, using an image search engine such as Google Image, <http://images.google.co.uk>*):
 - first bacteria (cells without a nucleus)
 - first eukaryotes (cells with a nucleus)
 - first multicellular organisms
 - first animals with hard parts (e.g. a trilobite)

- first plants and animals on land (e.g. early arthropods and land plants from Rhynie Chert, Scotland)
- first amphibians (e.g. *Ichthyostega*)
- first reptiles (e.g. *Hylonomus*)
- first dinosaurs (e.g. *Thecodontosaurus*)
- first mammals (e.g. *Morganucodon*)
- first birds (e.g. *Archaeopteryx*)
- first flowering plants (e.g. *Archaeofructus*)
- first human (genus *Homo*)
- a card labelled "Origin of the Earth"
- 5 metre length of string, marked every 500 million years (allows 0.4m for fixing at each end)
- metre ruler or tape measure
- 13 clips or clothes pegs to attach the pictures to the string
- drawing pins/clips to attach the string to the wall

Useful links:

The Virtual Fossil Museum www.fossilmuseum.net
The Toilet Paper Timeline
www.worsleyschool.net/science/files/toiletpaper/history.html

Source: Developed as part of an Earth Science Education Unit 'Creative Science' workshop by Rob Tweats, Kath Swinson, Cynthia Burek, Tom Basher, Cally Oldershaw and Susannah Lydon

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