

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, (pages 3 - 7), 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: 10 - 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>)	3	0.3
First grasses	55	5.5
K-T boundary mass extinction	65	6.5
First flowering plants	130	13
First birds	160	16
First mammals	220	22
First dinosaurs	230	23
The 'Great Dying' mass extinction	251	25.1
First reptiles	315	31.5
First plants with seeds	360	36
First amphibians	370	37
First plants on land	430	43
First animals with hard parts	545	54.5
First multicellular organisms	2000	200
First eukaryotes	2100	210
First bacteria	3500	350
The origin of the Earth	4567	460

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:

- 16 pictures representing various organisms plus an 'Origin of the Earth' card. These should be cut out from pages 3 to 7. They are reproduced with permission from a workshop produced by the ESEU, Keele University.
- 5 metre length of string, marked every 500 million years (allows 0.4m for fixing at each end)
- metre ruler or tape measure.
- 17 clips or clothes pegs to attach the pictures to the string.

Useful links:

The Virtual Fossil Museum

<http://www.fossilmuseum.net>

The Toilet Paper Timeline

www.worsleyschool.net/science/files/toiletpaper/history.html

Source:

Earth Science Education Unit

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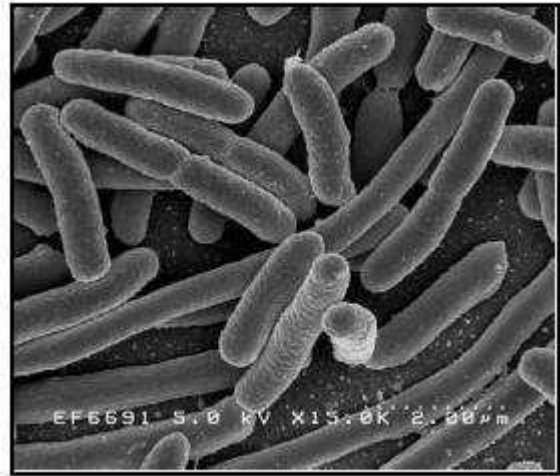
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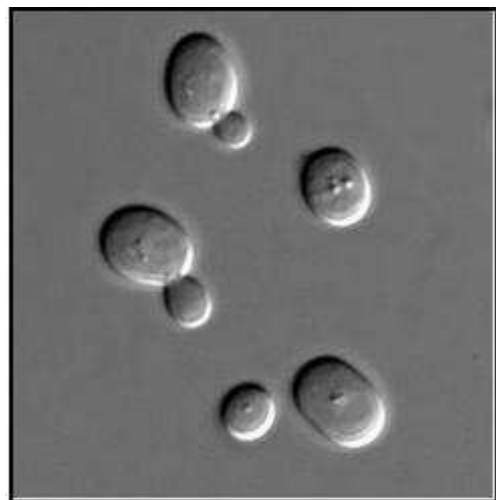
Origin of the Earth



**First bacteria
(cells without a nucleus)**



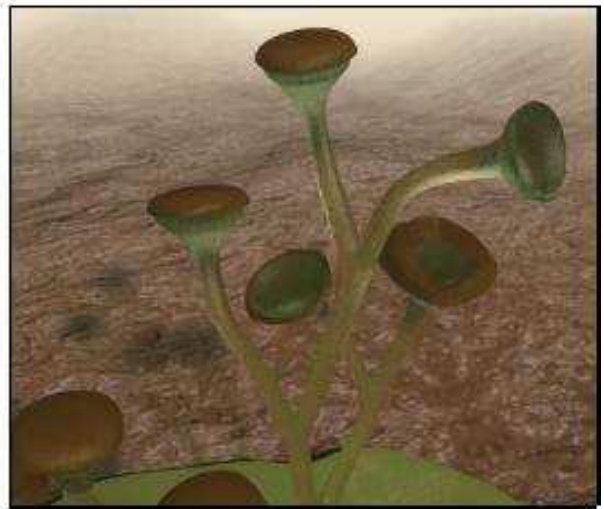
**First multicellular
organisms**



**First eukaryotes
(cells with a nucleus)**



**First animals
with hard parts**



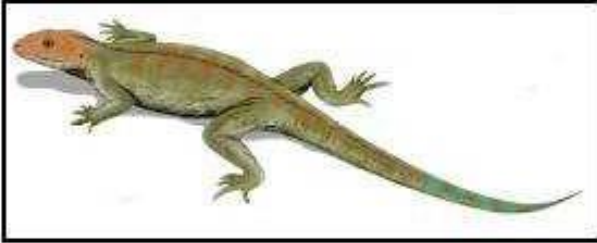
**First plants
on land**



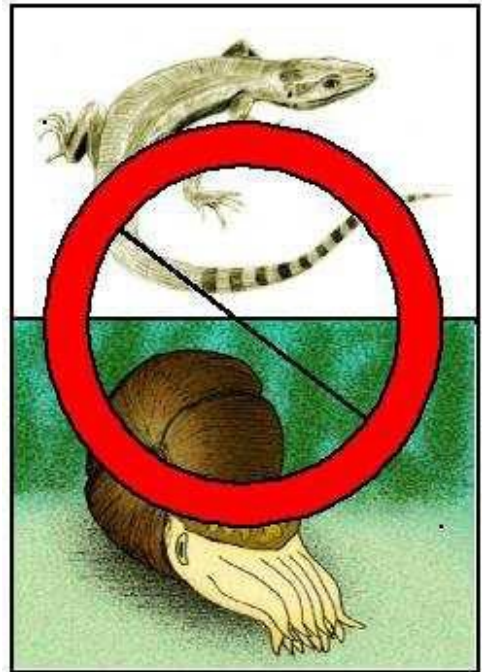
First amphibians



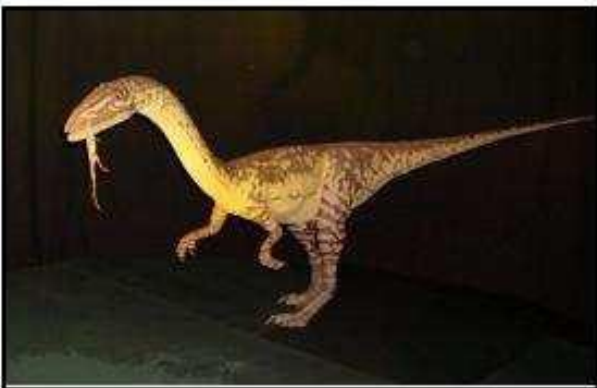
**First plants
with seeds**



First reptiles



**The 'Great Dying'
mass extinction**



First dinosaurs



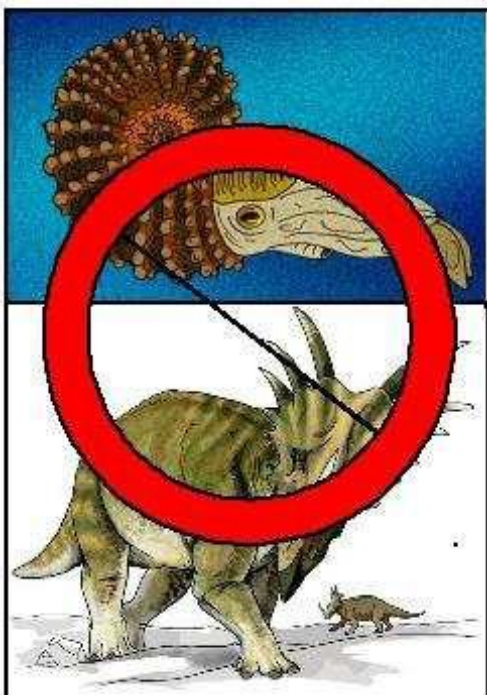
First mammals



First birds



First flowering plants



**K-Pg (K-T) boundary
mass extinction**



First grasses



First 'humans' (genus *Homo*)

Source of images:

First bacteria, scanning electron micrograph of *Escherichiacoli* - NAIAD (public domain)

First eukaryotes, *Sacharomyces cerevisiae* cells in DICmicroscopy - Masur (public domain)

First multicellular organisms, *Grypania spiralis* (Negaunee Iron-Formation, Paleoproterozoic, 2.11 Ga)
(Wikimedia Commons)

First animals with hard parts, 2 *Kainops invius* specimens - © Moussa Direct Ltd.

First plants on land, *Cooksonia pertoni* - © Smith609,

First amphibians, model of *Ichthyostega* - © Dr. Guünter Bechly

First plants with seeds, fruiting twig of *Ginkgo biloba* - © IMC

First reptiles, *Hylonomus lyelli* - © ArthurWeasley, Nobu Tamura (<http://www.palaeocritti.com>)

The 'Great Dying' mass extinction, top image is an *Archaeothyris* - © ArthurWeasley, bottom image is an
Aenigmatoceras rhipaeum - © Apokryltaros

First dinosaurs, *Coelophysis* animatronics model - © Firsfron

First mammals, *Adelobasileus cromptoni* - © Nobu Tamura (<http://www.palaeocritti.com>)

First birds, *Rahonavis ostromi* - © Nobu Tamura (<http://www.palaeocritti.com>)

First flowering plants, *Amborella trichopoda* - © Scott Zona

K/Pg (K-T boundary mass extinction), top image is a *Douvilleiceras mammilatum* - © Apokryltaros, bottom
image is a *Styracosaurus* - LadyofHats (public domain)

First grasses, - © D.Herman (public domain)

First 'humans' (genus *Homo*) - © Gunkarta Gunawan Kartapranata