Fossil or not?
Discussion about what is a fossil and what is not

This is a practical activity with pictures (page 3) and/or specimens to help you to discuss what is a fossil and what is not.

Give the pupils these definitions:
A fossil: is any preserved sign of past life, more than 10,000 years old;
A body fossil: is the remains of the body of an animal or plant, or the imprint or cast of it
A trace fossil: indicates that an animal or plant was there, but is not a body fossil; it includes footprints, burrows, signs of roots, tooth marks, etc.

Ask the pupils:
- Now you know what fossils are, can you put the pictures and/or specimens into three groups and label them: (1) Body fossil (2) Trace fossil (3) Not a fossil.

(You may like to give the pupils pre-prepared labels.)

- Which of the following are fossils? 4000 year-old footprints like ours; a squirrel killed on the road; 3500 million year-old cell filaments; a petrified tree stump; the trail of a trilobite in 530 million year-old rocks; 'tree-like', dendritic mineral growths; a beach pebble with holes bored by marine organisms; a human shape preserved in volcanic ash at Pompeii; a piece of dinosaur skin?

A body fossil of a bivalve
Photo by Peter Kennett

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The back up:

Title: Fossil or not?

Subtitle: Discussion about what is a fossil and what is not.

Topic: This activity fits well with lessons about the development of life on Earth and with sorting objects into groups.

Age range of pupils: 8 - 16 years.

Time needed to complete activity: 20 minutes.

Pupil learning outcomes: Pupils can:
- distinguish between what is and what is not a fossil;
- discuss the criteria for making that decision.

Context: The fossil record is evidence for evolution. In order to study it, we need to understand what a fossil actually is. Pupils may think that only the bones and teeth of animals can be fossilized, and that fossils have to be preserved in rock.

- What is a fossil? *A fossil is any preserved evidence of life, usually regarded as more than 10,000 years old (the start of the Holocene Epoch). Fossils consisting of the organisms themselves, or of isolated body parts, are known as body fossils. Fossils which preserve evidence of behaviour (such as footprints, burrows and droppings) but not body parts, are known as trace fossils. Some rocks that contain fossils are unconsolidated, such as some clays and sands.*

The pictures show the following:-
- fossil bone *(body fossil)*
- hazelnuts *(not a fossil – not old enough)*
- fossilised wood *(body fossil)*
- fossil shell *(body fossil)*
- desiccation cracks *(not a fossil – evidence of a dry environment but not evidence of life)*
- fossil tooth *(body fossil)*
- dinosaur footprint *(trace fossil)*
- insects in amber *(body fossil).*

- Should the following be regarded as fossils?
  - 4000 year-old footprints like ours as found in mud north of Liverpool,UK; *(not old enough to be a trace fossil);*
  - a squirrel killed on the road *(not a fossil, not old enough);*
  - 3500 million year old cell filaments *(body fossil);*
  - a petrified tree stump *(body fossil);*
  - the trail of a trilobite in 530 million year-old rocks

(trace fossil);
- 'tree-like', dendritic mineral growths *(not a fossil – not produced by life);*
- a beach pebble with holes bored by marine organisms *(probably not a fossil, unless the boring took place more than 10,000 years ago, in which case the boring is a trace fossil);*
- a human shape preserved in volcanic ash at Pompeii *(not old enough to be a fossil – Vesuvius erupted, burying Pompeii, in AD79);*
- a piece of dinosaur skin *(body fossil).*

Following up the activity:
Consider what would be the best way for you to leave a sign of your life for the future? For it to be classified as a fossil, it would have to last for more than 10,000 years!
(See Earthlearningidea 'Dead and buried - how could I become fossilised?' to be published on 10th November 2008.)

Underlying principles:
- Fossils are the remains or traces of animals and plants that are more than 10,000 years old.
- The fossil record is evidence for evolution.

Thinking skill development:
- By organising objects into groups pupils are establishing a pattern.
- Recognising that some objects are not fossils, even though they appear to be, involves cognitive conflict.
- Discussion about the activity is metacognition.
- The ability to say something about the environment of the animal or plant when it was alive is bridging.

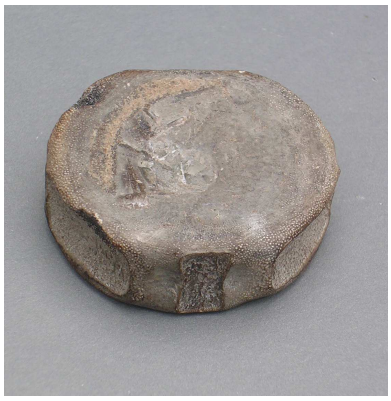
Resource list:
Pictures of the following (supplied - you may wish to replace some with your own specimens)
- fossil bone
- hazelnuts
- fossilised wood
- fossil shell
- desiccation cracks
- fossil tooth
- dinosaur footprint
- insects in amber

Include more specimens or pictures of your own, such as:
- egg-shaped pebble (not a fossil – not organic)
- modern tooth (not a fossil – not old enough)
- coprolite (fossil droppings; trace fossil)
- fossil leaf (body fossil)
- fossil burrows (trace fossil).

- three sheets of paper, or card, labelled 'body fossil', 'trace fossil' and 'not a fossil' on which to group the pictures or specimens, (optional);
- definition cards with the following definitions, (optional);
  A fossil: is any preserved sign of past life, more than 10,000 years old;
  A body fossil: is the remains of the body of an animal or plant, or the imprint or cast of it;
  A trace fossil: indicates that an animal or plant was there, but is not a body fossil; it includes footprints, burrows, signs of roots, tooth marks, etc.

Useful links:
http://www.oum.ox.ac.uk/thezone/fossils/intro/index.htm
http://www.discoveringfossils.co.uk/Whatisafossil.htm
http://unmuseum.mus.pa.us/fossil.htm
http://www.windows.ucar.edu/tour/link=/earth/geology/fossil_intro.html&edu=elem
http://museumvictoria.com.au/prehistoric/what/index.html

Source: Earth Science Education Unit, Keele University - www.earthscienceeducation.com
2005 Dead and Buried? Teaching KS4 Biology.



Fossil bone - Ichthyosaur vertebra *Photo: P.Kennett*

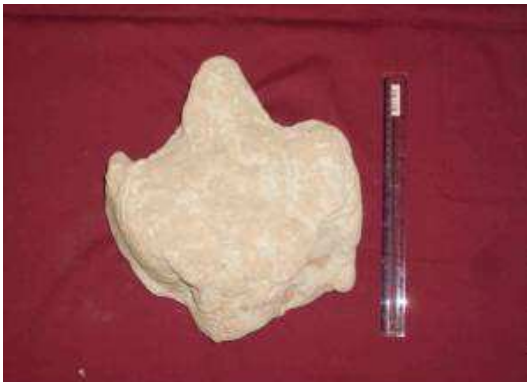
Some hazelnuts *Photo: P.Kennett*

Fossil wood *Photo: P.Kennett*

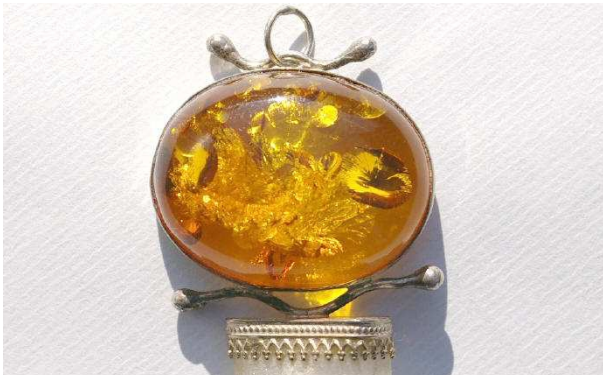
Fossil shell *Photo: P.Kennett*

Desiccation cracks *Photo: P.Kennett*

Fossil shark tooth *Photo: P.Kennett*



Cast of fossil footprint of hind foot of *Iguanodon*
Photo: P. Murphy, Leeds University



Insects in amber *Photo: E. Devon*