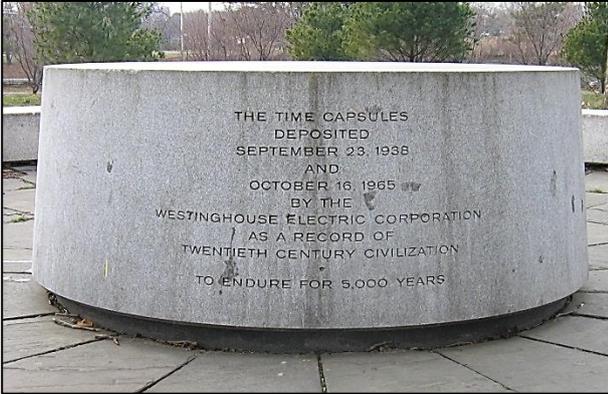


A rock is a time capsule – a message from the past Bringing to life the extraordinary stories of ordinary rocks

Time capsules preserve examples of the conditions on Earth at the time they were buried. An example is the Westinghouse time capsule in the image below (and in the 'Context' section).



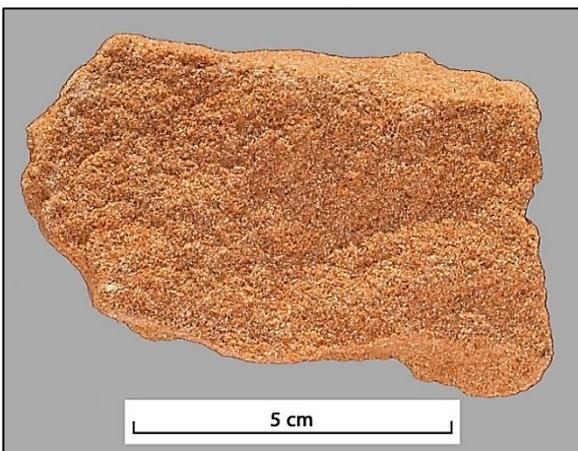
Marker of one of the two Westinghouse Time Capsule sites in New York, USA (see 'Context' for details).
(Image by Doug Coldwell under the terms of the GNU Free Documentation License.)

But nature has been making its own time capsules for many millions of years – and these are called rocks.

Every rock contains evidence of what the Earth was like when it formed. When we understand what the rock is telling us, we can begin to bring to life the extraordinary stories of ordinary rocks.

We can do this for any rock – these rock examples come from the Earth Science Education Unit's 'Virtual rock kit' at: https://www.earthscienceeducation.com/virtual_rock_kit/DOUBLE%20CLIK%20TO%20START.htm

An ordinary rock, No! – a sign of a past desert



This was loose red sand before it became a red sandstone. It is very well sorted, meaning that the grains are all similar sizes. We find well-sorted red sands like this in today's deserts. Weathering enriches the iron giving sand a red colour while wind transport leaves the bigger grains behind and carries finer grains far away. So the sand was laid down in a desert just like some of today's deserts. It is Triassic in age, so this happened 200 – 250 million years ago.

An ordinary rock, No! – a sign of a past eruption



This was flowing basalt lava before it solidified into rock. The interlocking crystals show that it is an igneous rock, made from molten magma. The dark colour tells us that it is basalt, a lava that can flow quickly over the surface. The fine crystal size shows that it cooled and solidified at the surface over days. Since basalt lava eruptions are fairly safe – you could have watched it all happen.

An ordinary rock, No! – a sign of the building of a mountain range in the past



Slates like this are formed from other rocks by the huge temperatures and pressures in the roots of mountains as they are built. Mountain-building episodes are caused by plate tectonic collisions. Slate is formed at temperatures of 200 – 400°C and depths of 3 – 4 km from rocks like mudstones as plates collide. Since the way slates break (their cleavage) formed at right angles to the pressures, we can even work out the direction of the mountain range and so the line of plate collision. This means that if you are standing on an exposure of slate, you are deep within the roots of an ancient mountain chain.

The back up

Title: A rock is a time capsule – a message from the past.

Subtitle: Bringing to life the extraordinary stories of ordinary rocks.

Topic: When we see a rock as a bundle of evidence of how the Earth used to be, we can begin to look for the clues that tell us about its past history, and the past history of the planet.

Age range of pupils: 7 years upwards

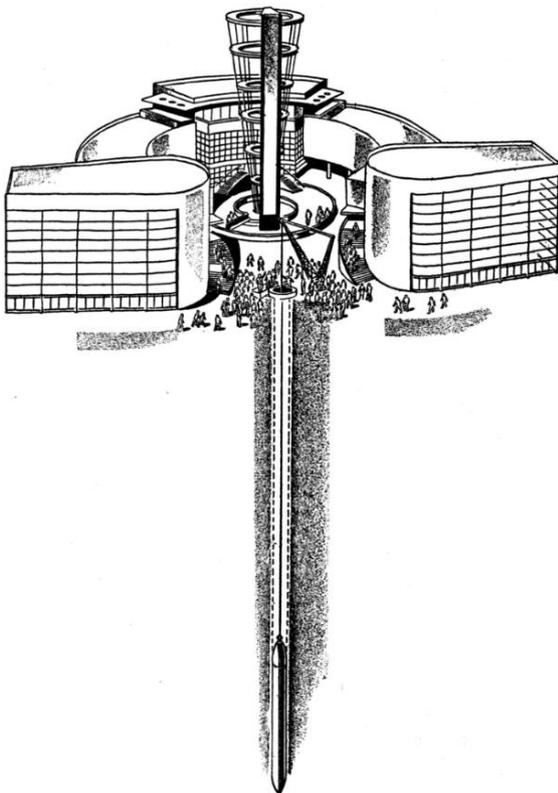
Time needed to complete activity: 5 – 10 minutes for each rock 'brought to life'

Pupil learning outcomes: Pupils can:

- explain that rocks are evidence of the past on our planet;
- explain some of the clues that rocks contain, which show us how they formed, and what the area was like at the time.

Context:

Time capsules are often buried during the start of a building project or other major event. The first Westinghouse Time Capsule was buried in 1939 as part of the New York World Fair (images below), but time capsules are buried as part of many different projects. One may have been buried beneath your school. They are buried to help people in the future to know more about what life was like in the past.



Burial under the site of the New York World's Fair of the first Westinghouse Time Capsule in 1939 - designed to last for 5000 years.
(Image in the public domain.)



Replica of the 1939 Westinghouse Time Capsule.
(Image by Doug Coldwell under the terms of the Creative Commons Attribution-Share Alike 3.0 Unported license.)

Rocks are natural time capsules which can tell very similar stories. By using the 'time capsule' approach you can bring a rock to life in ways that will amaze pupils and adults alike.

Following up the activity:

If your class had been there when a rock was formed, ask what they would have put into a (time-proof) time capsule that was buried at the same time. Examples might include:

- desert sandstone – examples of dead animals and plants that were alive at the time, pictures of the scenery or the patterns of the stars;
- basalt lava – drawings of the eruption, or etchings of the eruption scratched onto rock tablets;
- slate – examples of the fossils in the original mudstone, that were deformed during the mountain-building.

Underlying principles:

- All rocks contain clues about the way they were formed.
- These can be extended to interpret the conditions of the local region as the rocks were formed.

Thinking skill development:

Considering all the clues in a rock together to paint a picture is a construction exercise. Clues that seem not to fit provide cognitive conflict. Going from the clues to the environment of formation is a bridging exercise.

Resource list:

- rock specimens, as rock fragments, photos or in rock exposures

Useful links:

Try putting 'Time capsule' into a search engine like Google to find time capsules in your own region.

The ELI What was it like to be there in the rocky world? http://www.earthlearningidea.com/PDF/What_was_it_like_to_be_there_-_rock.pdf

Source: Chris King of the Earthlearningidea Team.

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