



# Information Pack for Teachers

[www.timetruck.co.uk](http://www.timetruck.co.uk)



Prepared by Sebastian Watt, TT2006, with thanks to Annette Shelford and Susan Conway.

Time Truck 2006 is supported by the following sponsors:



In addition, Time Truck 2005 was supported by the organisations below.



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# THE TIME TRUCK - WHAT, WHO, WHY?

The Time Truck is an interactive and hands-on learning scheme about the Earth sciences, brought to schoolchildren through a variety of exhibits and activities by student volunteers. The Truck itself is a 7.5 tonne truck filled with posters and displays on four core geological themes – life, climate, tectonics and hazards – brought together with a focus on geological time. Our school visits also incorporate classroom-based activities studying the rock cycle and fossils.

The Time Truck is organised and run by student volunteers from the Department of Earth Sciences at the University of Cambridge, with assistance and advice from staff at the Sedgwick Museum of Earth Sciences. It was started in 1998 by a group of enthusiastic Sedgwick Club members (The university student geological society) as a contribution to the National Science Week. Time Truck is now independent of the Sedgwick Club and visits local schools during Cambridge Science Festival, though organisation by the committee goes on throughout the year. The scheme benefits from close contact with the Sedgwick Museum of Geology, who provide many of our rock and fossil exhibits, giving children a unique chance to handle rare specimens and enabling us to bring parts of the museum out to local schools. Student volunteers make much of our other material, while the rest has been acquired through sponsorship.

The Truck relies on sponsorship for its operation, and over the years has attracted a wide range of sponsors from local industry to national charitable organisations. Sponsors can help either financially or by donating exhibits and materials. The scheme is also part of National Science Week, Cambridge Science Festival, and has also been supported by Millennium Volunteers.



## Contact Information

For any enquiries relating to the Time Truck, please use the general contact details below

By post: Time Truck  
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Cambridge CB2 3EQ  
By e-mail: [timetruck@esc.cam.ac.uk](mailto:timetruck@esc.cam.ac.uk)

A full resources pack for teachers is available from  
[www.sedgwickmuseum.org/education/resources.html](http://www.sedgwickmuseum.org/education/resources.html)



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## Basic geological ideas

These can be introduced before we arrive for our visit. If we were unable to visit your school this year we hope the following pages may be useful for Earth Sciences teaching.

Please help the children get the most out of our visit by preparing them before we arrive. Before the Truck visits there are a few basic concepts which you could introduce. They would be very useful for preparing the children and helping to optimise their appreciation of what they see and learn during our visit. These are also the questions which we are most often asked when visiting! We will cover much of this material, but it's good if the children have some level of knowledge of these concepts.

- *What are rocks and minerals?*
- *What are fossils and how do they form?*
- *Why are fossil bones different to bones which have been buried?*
- *How old is the Earth- how long is geological time?*
- *How do earth scientists find out about the past?*
- *How do they use the evidence left behind in the fossil record to interpret what life was like at different times?*
- *What can earth scientists find out by the study of rocks and fossils?*
- *What are the limitations?*

There is also a resources directory at the end of this section that might be useful. A more comprehensive version of this glossary and further information is on [www.sedgwickmuseum.org](http://www.sedgwickmuseum.org).

*Also: Think about what questions would you like to ask, and what information you can find out during our visit that may contribute to follow-up project work.*



**Resources and references** which may be useful for preparation:

Useful books:

- Dorling Kindersley Eyewitness guides (e.g. Eyewitness Fossil; ISBN: 0679804404)
- Discovering Geology: Fossil Focus guides: A set of 12 very straightforward guides to major fossil groups, published by the British Geological Survey, available from [www.bgs.ac.uk/education](http://www.bgs.ac.uk/education).
- Holiday Geology Guides - areas which may be familiar to children, with geology simply explained. Published by the British Geological Survey, available from [www.bgs.ac.uk/education](http://www.bgs.ac.uk/education).

Online:

**Don't forget to look at the resources pages at [www.sedgwickmuseum.org](http://www.sedgwickmuseum.org) for regular updates of information and new links.**

- **<http://www.bbc.co.uk>**  
Lots of resources, often based around television and radio programmes. Includes "revision" pages such as "bitesize" which contain useful summary notes. BBC News archives also hold some very interesting stories ideal for literacy exercises or project background reading for older children or adult learners.
- **<http://www.geolsoc.org.uk/template.cfm?name=EIOH>**  
Geoscience and hazards; earthquakes and volcanoes and their effects on society and settlements. Downloadable pdf leaflets from the British Geological Society.
- **<http://www.thinkquest.org/>**  
A very good online "library" style resource. Go to the Science categories from the main index and there is a whole range of Earth science and environment information, including volcanoes, plate tectonics, deserts and petroleum. Really well illustrated.
- **<http://cybersleuth-kids.com/sleuth/Science/Geology/index1.htm>**  
More geological facts and figures with good pictures.



## Geology in the classroom

Sadly we are only able to visit a few schools each year, and even for the schools we visit our teaching sessions are over very quickly. Any introduction given by our volunteers is only the beginning of the exciting world of Earth Sciences. Why not build on our work and help the children to explore an aspect of the day that interested them in more depth, or use the resources provided and our ideas to explore the Earth in your classroom.

Teaching material and specimens can be borrowed from the Sedgwick Museum of Earth Sciences in Cambridge, in the form of loan boxes. Why not try to make your own museum or exhibition, and get the children to show any of their own rocks or fossils? For loan boxes please contact the museum on (01223) 333456 or [sedgwickmuseum@esc.cam.ac.uk](mailto:sedgwickmuseum@esc.cam.ac.uk).

### And outside the classroom...

A visit to the Sedgwick Museum is a wonderful way to enthuse your class about geology as well. <http://www.sedgwickmuseum.org/education> is the place to start planning a school visit. Annette Shelford, the museum's education officer, can offer advice and hands-on activities based in the museum.

## Points for classroom discussion

### The Time Truck:

We looked at the extremes of geology, focusing on life, catastrophes, tectonics, and landscapes and climate. As Earth Scientists, we are always looking for connections and relationships between these different aspects of the subject.

### Catastrophes:

- Find out about volcanic eruptions and the effect they have had on plants, animals, people and the landscape. Pompeii (AD79), Mount St Helens (1980) and Krakatau (1883) might be good ones to look at.
- Why do people like to live near volcanoes?
  - Rich soils
  - Hydrothermal energy
- Find out about different types of earthquakes, how and where they



happen. Explore the effects of earthquakes, from the short term destruction and associated phenomena such as tsunamis, to the building of mountains.

#### Tectonics:

- Find out about the Earth's plates and what happens when they collide.
  - What causes earthquakes and volcanoes, and why do we find them along plate boundaries.
  - Where are the plates made, and where are they destroyed?
  - How are mountains built, where do we get the highest mountains and the deepest sea trenches?

#### Extinctions:

- The dinosaurs may or may not have become extinct due to a meteorite hitting the earth and drastically affecting global climate. What kind of weird weather might you expect?
  - Debris from impact blocks out sunlight so everything gets cooler – what effects would this have on life?
  - What other kind of event may have had similar effects? – massive volcanic eruptions?
- Have any other animals become extinct more recently, and what is the impact of man on animal and plant life?

#### Landscapes and Climate:

- Look at the world's different climatic regions and the types of landscape we see in them.
- How does erosion destroy mountains; where does all the eroded material end up.
- Is climate changing? What would happen if the ice caps melted, and what is causing them to melt? Is it the result of human activity?

#### The rock cycle:

During the visit, a brief overview of the rock cycle will be given, and then each group will concentrate on a different aspect.

- How could you tie all this information together with the whole class?
  - Groups report back on what they found out by making drawings and writing a short report.
  - Bring all of these reports together as a class mural. Use the Sedgwick museum loan box (details can be found at





The terms below may provide useful definitions in your teaching of the Earth sciences. A more comprehensive glossary and additional teaching material can be found at

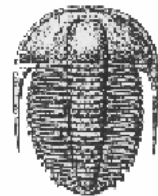
[www.sedgwickmuseum.org/education/resources.html](http://www.sedgwickmuseum.org/education/resources.html).

## A

**Ammonoid:** A group of extinct sea-creatures with coiled shells. They lived in the seas during the Mesozoic (see **geological timescale**). The shells are divided into chambers. The animal was probably rather like a squid or octopus with tentacles and a beak. A tube joined together all of the chambers of the shell, allowing the animal to breathe. Ammonoids are very similar to nautiloids which are still alive today.



**Arthropod:** Insects, spiders, mites, crabs and lobsters are all types of arthropod. They have tough exoskeletons and paired jointed limbs. The extinct animals, trilobites (left), are also arthropods.



## B

**Basalt:** A dark coloured volcanic rock. Melted rock from deep within the earth erupts out of volcanoes to form basalt. 70% of the Earth's surface is covered by solidified basalt lava flows

**Belemnoid:** A group of extinct sea-creatures with a bullet-shaped shell. They probably looked rather like squid or cuttle fish.



**Bivalve:** A group of molluscs with flattened bodies enclosed by a pair of shells (valves) made of hard calcite. Oysters and mussels are bivalves



**Burgess Shale:** A layer of rocks in British Columbia, Canada, which contains soft-bodied fossil animals which lived 500 million years ago. Some of these animals are very strange looking, and do not appear to have living descendants.



Such preservation is very unusual.

## C

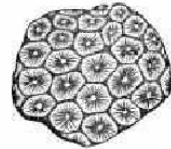
**Calcite:** The mineral form of calcium carbonate. Limestones are made mostly of calcite.

**Cambrian Explosion:** The term used to describe the very sudden appearance of a huge diversity of fossil organisms in the sedimentary rocks of the middle Cambrian.

**Chalk:** A white limestone made from tiny mud-sized particles. Deposition during the Cretaceous period was dominated by chalk.

**Coal:** A carbon-rich mineral deposit made of the remains of fossil plant life. It is first deposited as peat, but over time is buried, compressed and heated which changes it physically and chemically. There are different grades of coal depending on the amount of water and gases left inside the deposit, and the percentage of carbon present.

**Coral:** Corals are important reef-building organisms from the late Palaeozoic (see **geological timescale**) onwards. Large reefs of corals can be found in tropical seas, like the Great Barrier Reef off Australia.

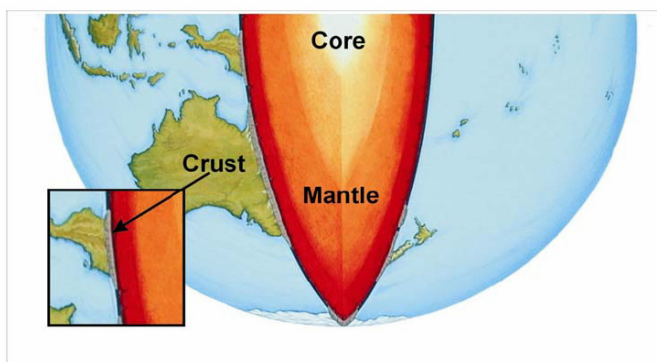


## D

**Deposition:** The process by which sediment is laid down and builds up on the Earth's surface- the direct opposite to erosion.

**Dinosaur:** Any of large group of extinct, often gigantic and mainly terrestrial, herbivorous and carnivorous reptiles, which lived throughout the Mesozoic era. It is thought that one group of dinosaurs gave rise to the birds.

## E



Section through the Southern Hemisphere showing the 3 main layers which make up the Earth.

### Earth Structure:

The Earth is made up of 3 main layers: the crust, the mantle and the core. The core is made up of liquid metal and is surrounded by a rocky mantle that is so hot it behaves as if it is



a very sticky liquid. The crust is a very thin skin that makes up the surface of the Earth.

**Earthquake:** Violent shaking on the surface of the earth due to sudden movements deep within the earth's crust. The strength of an earthquake is measured using a seismometer.

**Erosion:** The removal of volumes of surface material due to physical and chemical phenomena involving physical and chemical weathering by processes involving rainfall, climate, ice, soils and tectonics, with removal of material by rivers.

**Extinct, extinction:** The disappearance of a type of organism from the Earth. Mass extinctions, such as the death of the dinosaurs, happen at certain times during the geological record, and these are believed to be the result of catastrophic events which cause a break-down in the ecosystem.

## F

**Fossil:** Fossils are the remains of plants and animals which lived on the Earth during the geological past preserved in the rocks.

## G

**Gastropod:** A group of animals with a typically coiled shell which, unlike the ammonoids, is unsegmented. Snails, whelks and slugs are living examples of gastropods.

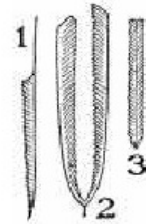


**Geological time:** Geological time is separated into different sections and subsections, usually due to the fossils found. Mass extinctions (e.g. when the dinosaurs died out) often give rise to new geologic 'time-zones'. The dinosaurs died out at the boundary between the Cretaceous and the Tertiary.

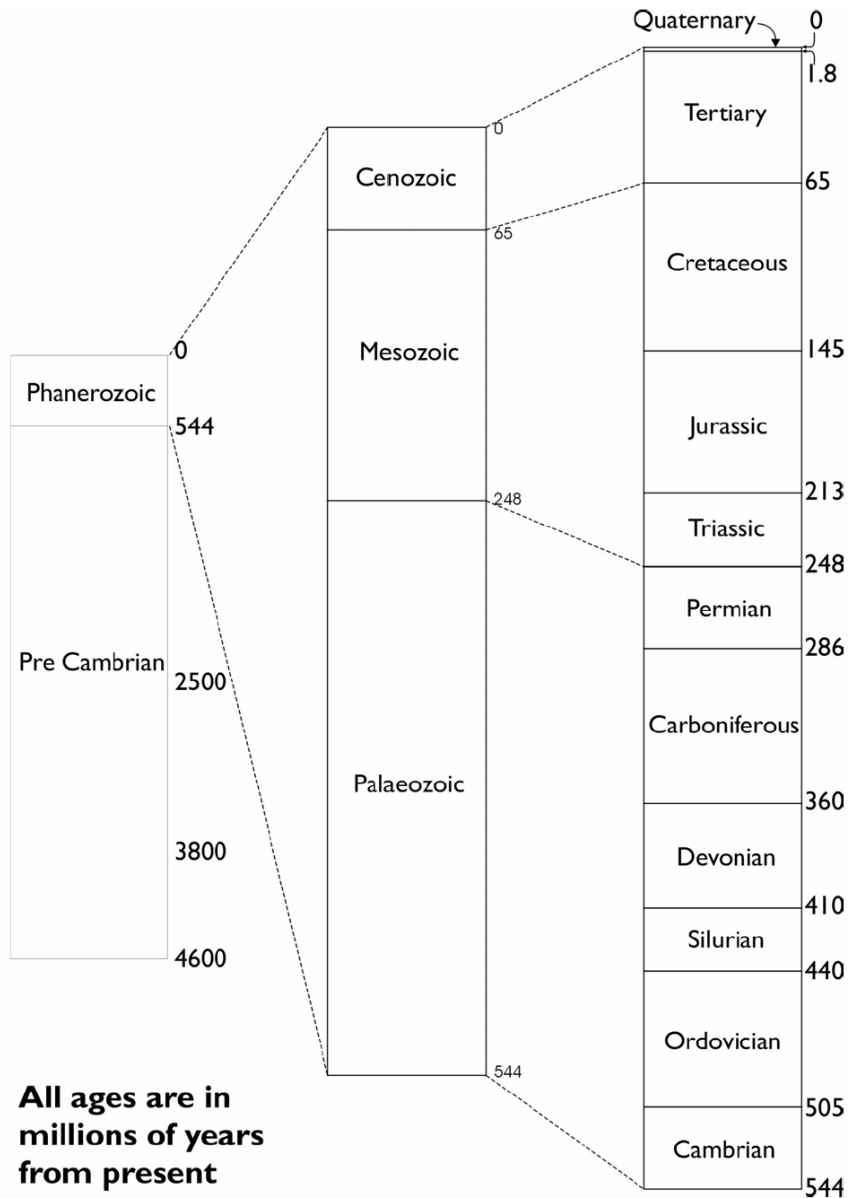
**Granite:** An igneous rock which cools deep under the earth instead of being erupted from volcanoes. It contains large crystals of the minerals quartz, feldspar and mica. Continental crust is made from granite.



**Graptolite:** Stick-like colonial, marine animals which lived from the middle Cambrian to the Lower Carboniferous. They are very important for defining the geological age of rocks during the Devonian, Silurian and Ordovician in the UK.



**Geological Timescale:**



## I

**Ichthyosaur:** A Jurassic marine reptile which bears a superficial resemblance to a modern dolphin.

**Igneous:** Igneous rocks are formed when old rocks get so hot deep in the earth that they melt and rise up to the surface of the earth. As they cool, they solidify to form new rocks, often looking very different to the rocks that melted to form them. They can form deep within the earth (intrusive) or be erupted at the surface by volcanoes (extrusive)

## L

**Lava:** The name given to hot molten magma when it has reached the surface. Lava flows, along with other volcanic products such as ash, help to build up volcanoes.

**Limestone:** A sedimentary rock which is made up mostly from calcium carbonate (calcite), and often the remains of broken up fossil shells or microscopic animal skeletons, such as chalk.

## M

**Magma:** Hot molten rock often produced by the melting of rocks deep inside the Earth's crust, but can sometimes come directly from the mantle.

**Metamorphic, Metamorphic rocks:** Rocks which have been changed by being heated and / or squashed. As rocks are buried over millions of years, they are exposed to heat and pressure from the overlying rocks and from movements within the crust. This causes changes in their properties. The heat can make the minerals which make up the rock recrystallise, often in distinct layers or bands. One of the effects of recrystallisation is the loss of fossils from sedimentary rocks. Slate is mildly metamorphosed mudrock, while marble is metamorphosed limestone.

**Mineral:** Minerals are the building blocks of rocks. They are naturally occurring substances, which often have a crystalline form. They can be single elements (such as gold or diamond) or compounds (such as quartz or pyrite).



## Q

**Quartzite:** A rock made entirely of the mineral quartz.

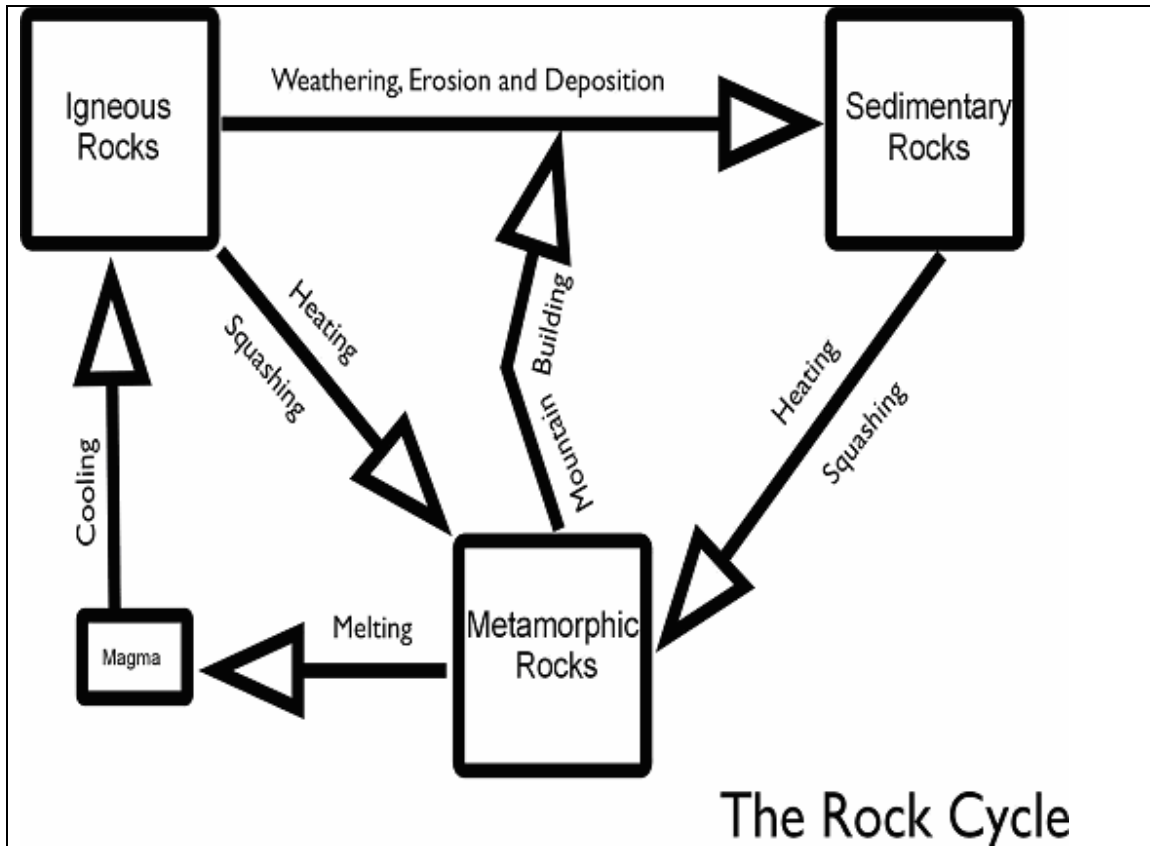
## R

**Recrystallise, recrystallisation:** The growth of new types of mineral in a rock due to the effects of heat and/or pressure.

**Rock:** Rock is defined as “A consolidated or unconsolidated aggregate of minerals or organic materials.” (Oxford Dictionary of Earth Sciences)  
Rocks can be made of a single type of mineral, or more than one mineral. For example, limestone is made just of calcite and quartzite is made just of quartz. Granite is made up of three main minerals, quartz, feldspar and mica.

**Rock Cycle:** This is a term referring to a collection of processes which shape the surface of the Earth. Rocks are constantly recycled by burial, melting, uplift and erosion. These processes are driven by energy from inside the Earth and from the Sun (See section 5.2)





## S

**Sediment:** The material produced by the effects of weathering at the surface of the Earth, and of various grain sizes, such as clay, silt, sand and gravel.

**Sedimentary rocks:** Recycled rocks made of fragments. The fragments can either be of organic matter or of other rocks and minerals. The organic material is often preserved as fossils. Limestone and sandstone are examples of sedimentary rocks.

**Shale:** A thinly laminated sedimentary rock made of tiny clay-sized sedimentary particles.

**Strata:** Distinctive beds or layers of rocks.

**Stratigraphy:** The study of rock strata and the relationships between them.

## T

**Trilobite:** A group of extinct marine arthropods which lived during the Palaeozoic



era. They had segmented bodies with three vertical lobes, commonly found as fossils.

## V

**Volcano:** A mountain built up through the eruption of layers of lava on to the surface of the Earth. They are found in areas of the Earth which are geologically unstable, such as near plate boundaries, or hot-spots where magma wells-up from deep inside the Earth.

## W

**Weathering:** The breakdown of rocks and minerals at and just below the Earth's surface caused by a number of physical and chemical processes. **Erosion** removes this broken down material.



## ***Information Pack Evaluation Form***

We would be very grateful if you would take a few minutes to answer the following questions. We need your feedback about this information pack to help us improve our resources for teachers and pupils, and we would be very grateful if you could take a few minutes to answer the following questions and return the form to us by post.

- Do you find the pack easy to use? (please delete) **Yes / No**
  
- If no, how would the structure or layout be improved for you?
  
- Have you downloaded additional copies of the pack from the website?  
**Yes / No**
  
- Is the information supplied about the Truck and its facilities useful? Is there anything else you feel you would like to have known about the Truck?
  
  
- How useful are the Earth Sciences background notes in Section 5? Do you feel that they are at an appropriate level?
  
  
- Did the information provided with the pack useful when preparing for the visit? **Yes / No**
  
- What age-group are the students you teach?
  
- Do you have any other comments or suggestions about the pack?



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Fold 2

The Time Truck  
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Cambridge CB2 3EQ

Affix  
stamp  
here



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Fold 1

To return this questionnaire, please fold along the dotted lines as indicated close with sticky tape, and return by post by affixing a stamp on the pre-addressed panel.

Thank you very much again for your feedback.

