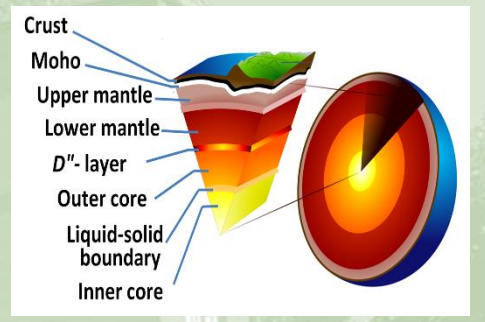
Home School with Charnwood Museum

Charnwood Rocks! Part 3 - A world in motion

We've talked in Part 1 about the ancient rocks of Charnwood, but did you know that when these rocks were being formed, this part of Britain was in a different part of the planet? In fact, the very ground beneath our feet is moving at roughly 2cm a year (about the same rate as your fingernails grow!)

To understand these movements, it might help to picture the Earth as a (hard-boiled) egg with the shell cracked into different sections. Think about these sections as being the outer layer of the Earth's crust, separated into different pieces which are called Plates. These Plates are made of solid rock. The Earth's surface is made up of a number of these plates, of various sizes, that move in different directions over the softer layer of rock below (called the Mantle).



This is the theory of Plate Tectonics, which is the study of these movements and what causes them. It was a revolutionary idea in 20th Century Geology, which changed our understanding of the planet on which we live. People had looked at maps of the world for many years and looked at the shapes of the continents. Some of them looked as if they could fit together like pieces of a jigsaw but there was no real explanation for how or why this could be.

Evidence for the new theory started in the 1950s when using new technologies, scientists could study and record the geology of the ocean floors. They identified underwater volcanoes, mountain ranges and deep trenches and were able to measure movements on the seabed. This work showed that the ocean floors are actually spreading apart as volcanic activity takes place and creates new rock at the bottom of the sea.

Using this information, scientists are now able to understand the following:

- How earthquakes happen and why they happen where they do
- How volcanoes develop and why they are where they are
- How mountains form and why they form
- How Tsunamis develop and what causes them

As the theory of Plate Tectonics developed, and more evidence was gathered, it explained how Continents move apart from one another and in other places come together. These movements can now be tracked accurately by GPS devices and satellites. It is thought that the heat rising from the Earth's core drives these plate movements by pushing liquid rock (Magma) to the surface which creates more crust.

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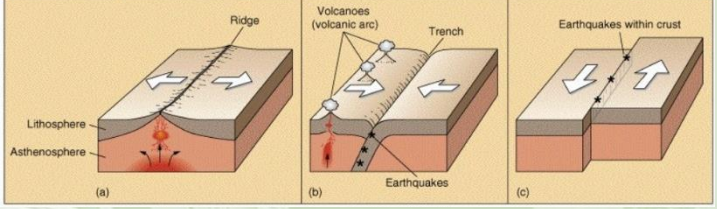
Where plates are moving apart as new crust is made, deep valleys and rifts form, where seas and oceans eventually develop. The Atlantic Ocean is widening as the American continent moves Westwards away from Europe.

Different types of plate boundaries

Type of Margin	Divergent	Convergent	Transform
Motion	Spreading	Subduction	Lateral sliding
Effect	Constructive (oceanic lithosphere created)	Destructive (oceanic lithosphere destroyed)	Conservative (lithosphere neither created or destroyed)
Topography	Ridge/Rift	Trench	No major effect
Volcanic activity?	Yes	Yes	No



Where plates move together, the land masses push upwards and mountains and volcanoes form. For instance, the plate containing India is moving Northwards into Asia and has created the Himalaya mountains. Italy is on a smaller plate and its movement towards Europe caused the Alpine mountain range.

Where plates are sliding along and past each other is usually where earthquakes occur as the plates slip and move suddenly; these areas are called Fault lines.

A major one is the San Andreas Fault in California USA. The shockwaves from undersea earthquakes cause floods and Tsunamis.

The plate on which Charnwood sits, and all of England, Wales and Southern Ireland has moved over the last 635 million years from its original position. This is thought to have been south of the Equator, roughly where the island of Mauritius now lies.

Hopefully these factsheets have explained how the ancient Charnwood Rocks were created and how they, (and we), have come to be where they (and we) are now.

For more information, look at www.bbc.co.uk/bitesize British Geological survey website: www.bgs.ac.uk or just put Plate tectonics into your search engine.

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Now see how you get on with the following questions

1. How fast are the Earth's plates moving? What grows at roughly the same speed?
2. What are the plates made of?
3. What is the name of the layer underneath the plates?
4. Have a look at an atlas, or a globe, or a map of the world and think about which continents look as if they fit together. How many can you see?
5. Scientists think that originally all the continents were joined up. Try drawing how you think that "supercontinent" might have looked.
6. What causes the plates to move?
7. What happens when 2 plates come together?
8. What happens when plates move apart?
9. What happens when plates slide against each other?

   Draw a picture of your answer to any or all of questions 7, 8 and 9.

10. Work out the distance the Charnwood Rocks have travelled over the last 635 million years?