

Things to spot on the trail...



Can you see patterns like these in the **Ashburton Marble**? The white patches are fossilised **coral** which are between 410 and 350 million years old!

Within the **granite** have you spotted large rectangular crystals of **feldspar**? Look closely at them and you might find that one half of the crystal will glint in the light, while the other side remains dull. This characteristic is due to twinning, where two sides of the same crystal have grown in different orientations.



See if you can spot a fossil like this in the rock which surrounds the windows and doors at the Great Stairway. This is the fossil of a **stromatoporoid**. These are an important group of fossil sponges that form some of the largest reef complexes in the fossil record.

Would you like to learn more about geology?

If you want to dig deeper into the geology of Devon there are many sources of information you can explore at www.devon.gov.uk/geology. Here you can also find a more technical explanation of the building stone used at County Hall which expands on this leaflet.

If you would like a summary of this in a different format such as large print, Braille or tape, or in a different language, please contact our Customer Service Centre on 0845 1551 005 or email: customer@devon.gov.uk

Groups of Rocks

Igneous – a rock formed from a molten state (or magma).
Sedimentary – rocks formed from sediments (e.g. sand or mud).
Metamorphic – rocks that have changed and recrystallised from an original rock without melting it.

Rock Recap

Breccia – this is a rock made of angular fragments of rock and coarse sediments from a variety of places.
Granite – an igneous rock which cooled slowly in the crust forming large crystals. This contains minerals such as quartz, feldspar, and mica.
Limestone – a sedimentary rock made from calcium carbonate. This can contain fossils and special sediment grains such as ooids.
Magma – molten rock which has evolved deep in the Earth's crust.
Marble – this is a metamorphic rock, which originally was a limestone.
Ooids – these are sedimentary grains which have been rolled on the seabed by currents and waves in carbonate mud. In cross section these look like tiny snowballs.
Pangea Supercontinent – the name given to the huge landmass formed in Permian times by the collision and merging together of the world's pre-existing continents.
Plate Tectonics – this term refers to the slow movement of different parts of the Earth's crust (known as plates) which have created many of the major features of the Earth today.

Acknowledgments

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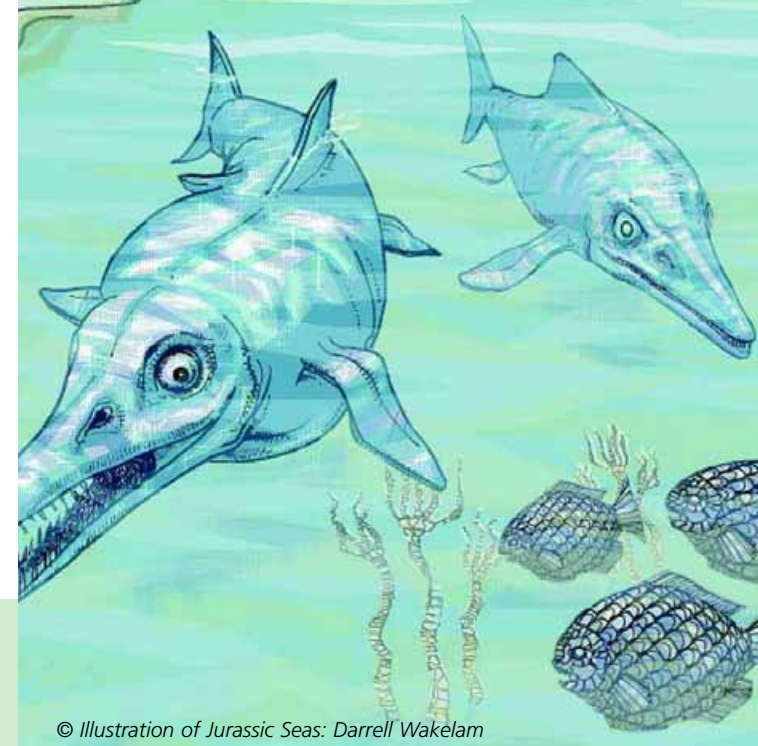
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Building Stones of County Hall

A Trail Through Geological Time



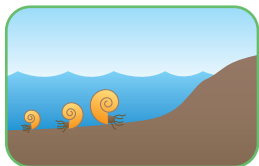
© Illustration of Jurassic Seas: Darrell Wakelam

Devon
County Council

Welcome to County Hall, which is the headquarters of Devon County Council in Exeter. Designed by architect Donald McMorrin and completed in 1964, the building was listed Grade II* in 1998. In the listing notice it is highlighted that the building is constructed with quality materials. We hope you enjoy this leaflet which guides you to some of the best examples of the interesting building stones used, with an explanation of their geology.

If you find a term in the leaflet you are not familiar with, refer to the 'Rock Recap' section which should contain an explanation.

This page summarises when the building stones were created and in what kind of environment...



1. The Devonian

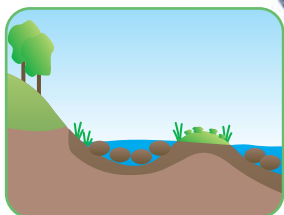
415 – 360 million years ago. Devon under the sea and near to the equator.

Ashburton Marble is a marine limestone that formed around the shores in the Devonian period roughly 370 million years ago.

Trail points 7 9

6. The End of the Jurassic into the Cretaceous

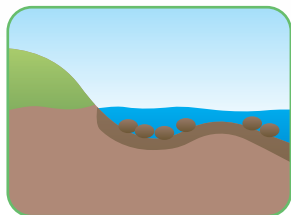
... Sea levels dropped, leaving freshwater lakes, swamps, and brackish estuaries.



The **Purbeck Limestone** (known more specifically as Thornback) is a freshwater or brackish limestone formed in warm shallow lagoons roughly 140 million years ago.

Notice how the rock is crammed with fossil shells including oysters. Crocodile and turtle bones have been recovered from this type of rock – although probably not from the walls in County Hall!

Trail points 4 7 9



2. The Carboniferous into the Permian

360 – 300 million years ago. Devon was moving north due to plate tectonics. A time of mountain building!

Squeezing and folding created the spectacular structures we can see along the coast of Hartland today.

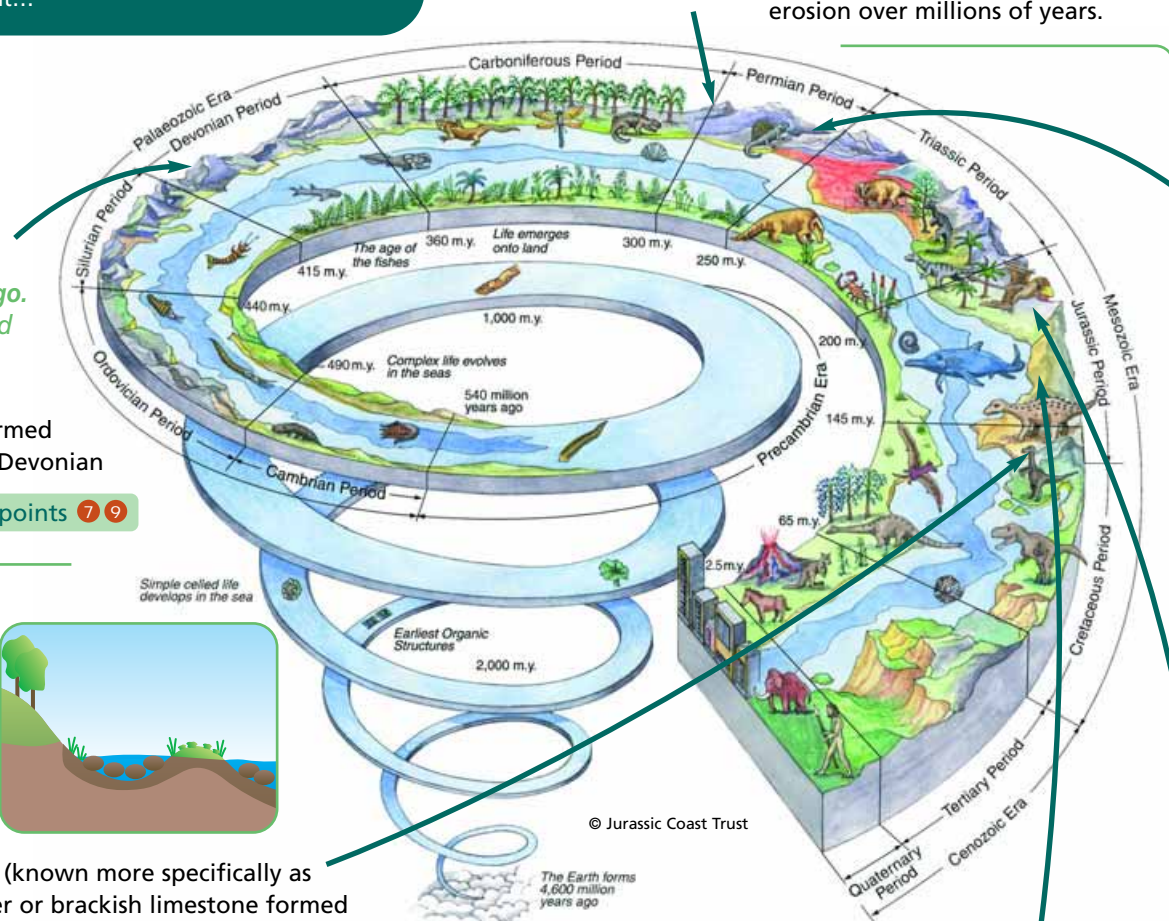
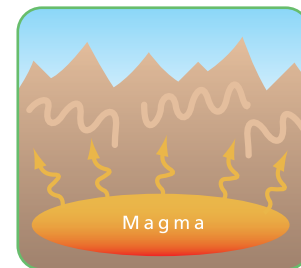
Granite formed when rocks at the bottom of the crust below the mountains started to melt to form magma. This magma rose slowly, cooling and solidifying to form the granite that finally became exposed on Dartmoor due to erosion over millions of years.

Large mineral crystals formed in the magma and are now seen in this igneous rock.

During this period, another igneous rock called **Greenstone** was formed. This rock is found in the Teign Valley, and like the granites, only became exposed after years of erosion.

Yorkstone (a sandstone from Yorkshire) was formed from sand washed down from the mountains and deposited in lower valleys.

Trail points 1 2 3 6 9



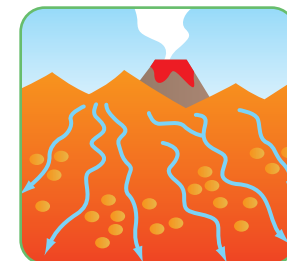
3. The Permian

300 – 250 million years ago. Red Desert Devon in the Pangea Supercontinent!

Exeter Volcanics – Lava which once erupted from volcanoes forms the igneous rocks used for building in and around Exeter today. These are the purple coloured rocks that crystallised very quickly from great lava flows. Sometimes you can see holes in the rock left by bubbles of gas which were trapped in the rock.

Flash floods swept the arid mountainsides. These carried with them pebbles and boulders of the underlying rocks which were eventually deposited as gravel at the mountain foot. These deposits are known as **Permian Breccias**. These rocks are a rusty red colour because they have a large amount of iron in them from the desert environment.

Trail point 10



5. The Jurassic continues...

...Tropical reefs and lagoons

Portland Stone was formed at this time in warm tropical and shallow sea roughly 145 million years ago. These are marine limestones. Shells such as oysters were preserved as fossils in this rock. This also contains ooids – plenty of these are being formed off the Bahamas today!

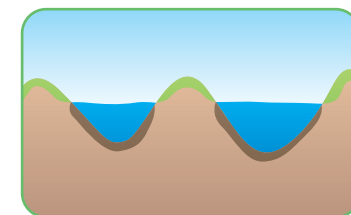
Trail points 7 9

4. The Jurassic

200 – 145 million years ago. Era of the Dinosaurs; Devon was under the sea again, and still moving north...

Sea level rose after the Triassic period, flooding the land. The area we now know as the Mendips in Somerset became islands, and it was around these island shores that **Doulling Stone** was formed.

Trail points 2 8



The County Hall Trail

Follow the numbered points on the map and explore the geology captured in the building stone around County Hall. Using the geological timeline and diagrams on the previous page you can see when the rocks were created and in what environment.

1 Go to the Visitor Car Park...

Here you can see two types of rock.

There are **granite** setts across the road **A**. If you look closely you should be able to spot minerals such as white feldspars, black mica and glassy grey quartz.

Notice the igneous **Greenstone** used as kerbstones **B**. It is thought that this rock might have been quarried in the Teign Valley.

Also see the composite paving slabs. These are not a true 'building stone' because they are formed from a mixture of crushed rocks and concrete **C**.



2 Go to the Main Entrance steps...

See the **granite** steps **D**. Different to the granite setts used by the car park, here we see light-coloured granite slabs used for most of the steps. Although we don't know the exact quarry location where these slabs came from, it is likely that they came from Cornwall or Dartmoor.

Look for **Yorkstone** paving and steps **E**. These are the dusty grey or light brown coloured stones making up one of the steps towards the main entrance. These are a type of sandstone (a sedimentary rock). It is likely that this was quarried from somewhere in Yorkshire.



3 Go to the Walkway...

Here there is more **Yorkstone** paving, **granite** gutters and **granite** window ledges around the red brick structures.

Look up! The roof is covered in **Cumbrian Slates**. Mud, which has been baked and squeezed (metamorphosed) forms the slate we see today. This material can be split easily into thin sheets, so is perfect for roofing!

As you walk into main reception notice the unpolished doorframe. This buff-coloured shelly limestone is **Douling Stone**. This is also in the Council Chamber, which is explained later.



4 Inside Main Reception...



Look down at the red tiles on the floor **F**. These are Welsh Quarry Tiles from Wrexham, Clwyd. These are made from **natural clay** which has been quarried and fired in kilns at Ruabon since 1878.

The black stone edging the floors is a **welded tuff** **G**. This came from a volcano during a massive explosive eruption forming ash. When the fragments of ash fell on the ground they were so hot they welded together to form the rock we see today.

The walls of main reception and along the main corridor have been clad with **Purbeck Limestone** **H**. This is 'Thornback' which is a particular type of Purbeck Limestone. The same wall cladding has been used in the antechamber and grand stairs.



Look out for these rocks as you continue along the main corridor...

5 Continue through to the Stairways...

Take a closer look at the distinctive black stairs. These are constructed of a manmade material called **terrazzo** – which is made from marble chippings. See if you can spot this material being used in other parts of County Hall!



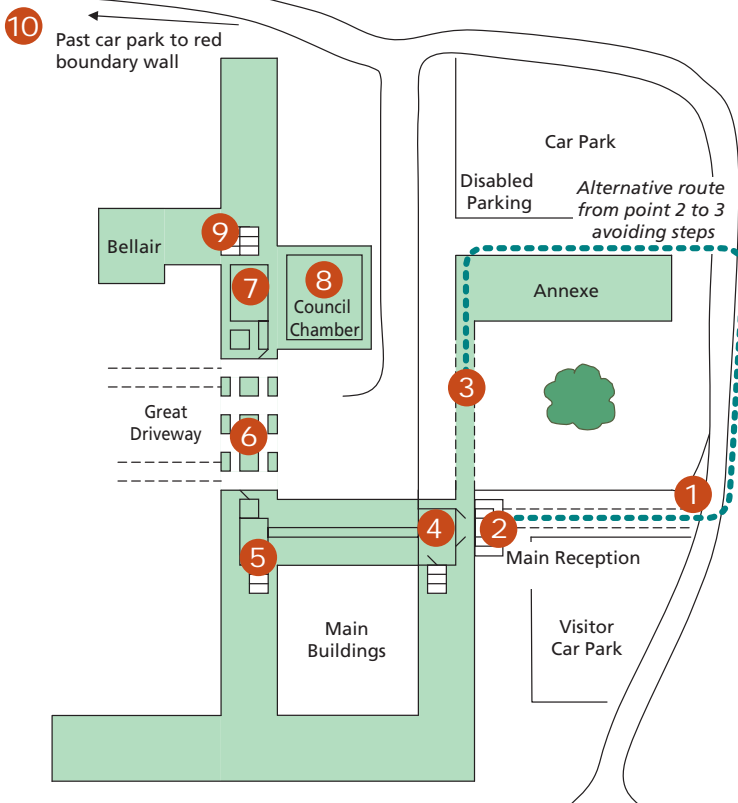
6 Outside to the Great Gateway...

Notice the huge **granite** pillars. These are the same granite as used for the steps to main reception and the window lintels. Look closely and you should be able to see large crystals in the rock.

Also look at the walkways with buff-brown **Yorkstone** paving. Look out for the marking on the stone: this is known as a 'combed' finish. This effect was purposely made during the sawing process for extra grip.



Map of County Hall Trail



7 Inside to the Antechamber...



Look out for the spectacular **Ashburton Marble** found on the floor of this area ①. This is the polished black, white, and red rock, which has lots of fossils. The fossils are mostly corals which often look like cartwheels.

This rock reveals that the location of Ashburton (where this rock was quarried) was once under a shallow tropical sea when this rock was formed.

Also, examine the light buff-coloured **Portland Stone** which is used as small squares between the Ashburton Marble floor tiles in the antechamber ②. See if you can spot some of the large shell fossils in this rock!

The **Portland Stone** is older than the stone cladding the walls, which is **Purbeck Limestone**.

8 Into the Council Chamber...



Surprisingly, for such a grand room, this has only one building stone on show. Look up at the high walls and see the **Douling Stone** cladding. This stone is quarried from Douling, near Shepton Mallet in

Somerset and has been used since the Middle Ages in buildings such as Wells Cathedral and Glastonbury Abbey.

Exit the Council Chamber and follow the corridor towards the grand stairway. Notice on your way the large **granite** commemorative stone inscribed and laid at the base of the back wall. This is similar to the granite used for the pillars in the great gateway.

9 On to the Grand Stairs...

Look at the steps which are formed of **Portland Stone**. If you look really closely at the rocks you should see small round white-yellow grains. These are ooids. Also look out for the large shell fossils!

Do you recognise the rock which clads the walls here? This is **Purbeck Limestone**, which we have already seen cladding walls near the main reception and in the antechamber.

Following the stairs upwards, notice that there is a third **limestone** used around the windows, doorframes, and lining the walls above the Purbeck Limestone.



At the top of the stairs look at the two beautiful columns of polished **Ashburton Marble**. This is another opportunity to look closely for the fossils mentioned previously, and for a three dimensional view of the rock. The columns are capped at the top and base by turned **Portland Stone**.



10 Outside to the County Hall Boundary Wall...

Exit the buildings and follow the pavements which are mostly made from **Yorkstone** and lined with **Greenstone**. Find the distinctive red wall behind the road north of County Hall. This wall pre-dates the construction of the main buildings and is constructed from **Exeter Volcanics** and **Permian Breccias**.

There are similar walls along Matford Lane and around Exeter Cathedral. The wall here is also made from broken bricks and a variety of reclaimed blocks of rock from the local area. This really was just built out of whatever came to hand!

