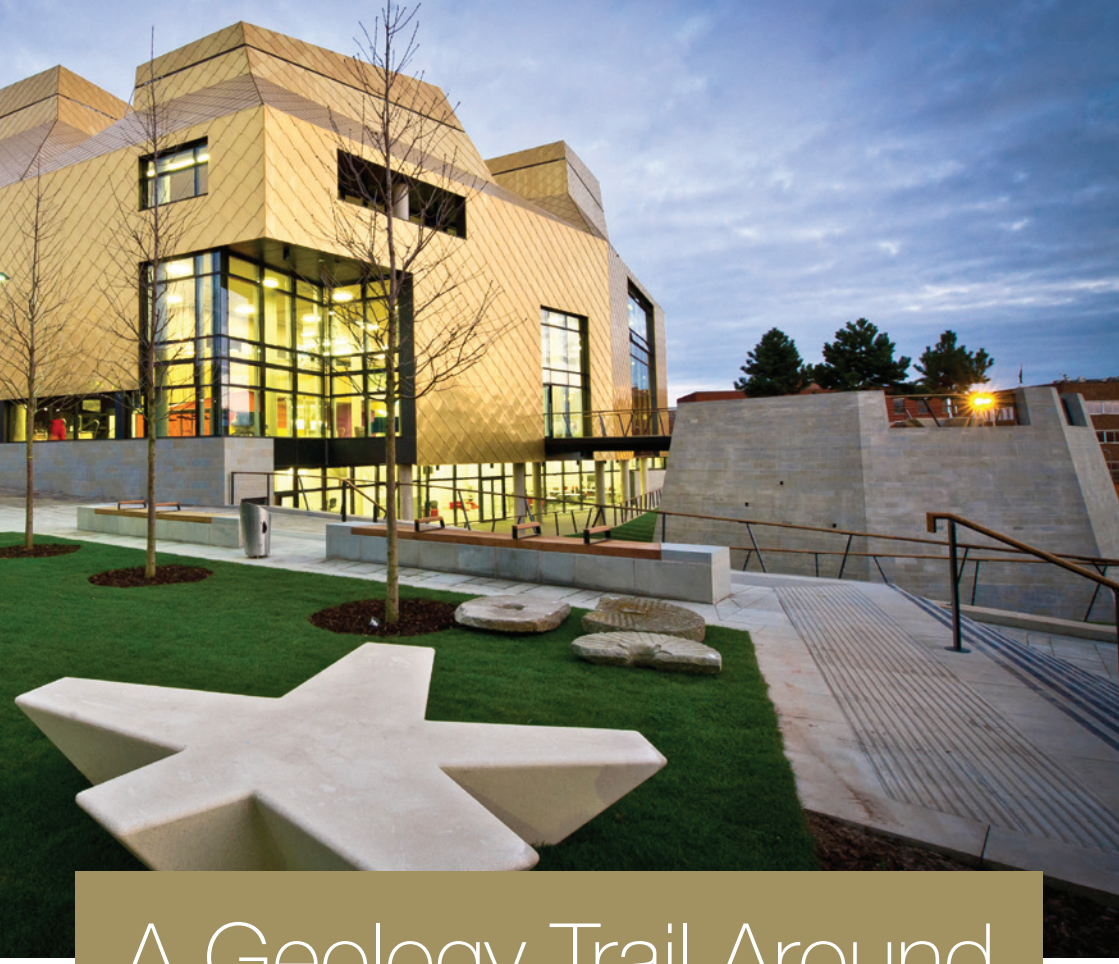


A Geology Trail Around

The Hive

a partnership between

University of Worcester

worcestershire county council

Abberley and Malvern Hills Geopark

There is an interesting story to be told as you walk around the building. There are many rocks for you to see. They are of different geological ages.
The Geological Time Scale text box will help you to understand ancient time as you look at the different rocks.

To start the trail, go outside the building look to the right of the entrance to see the outside wall made of bluish grey sandstone. This is a rock quarried in the Forest of Dean and it is of Carboniferous age. The grains of sand were deposited in river channels before becoming compacted over many thousands of years. The flooring in the building on this level is made from the same rock.

GEOLOGICAL TIME SCALE

(start of periods in millions of years ago)

Quaternary **2.6**

Neogene **23**

Paleogene **65**

Cretaceous **142**

Jurassic **205**

Triassic **248**

Permian **290**

Carboniferous **354**

Devonian **417**

Silurian **443**

Ordovician **495**

Cambrian **545**

Precambrian **4600**

As you enter the building look ahead and down and you will notice that all of the flooring is made of the same sandstone. Move to the bottom of the main staircase. Beneath this you will see some Roman remains composed almost entirely of a red sandstone. This rock is Triassic in age and is commonly found in north Worcestershire.

Quarrying for building stones along the River Severn was common for centuries. The red sandstone was obtained from quarries in the Ombersley area north of Worcester. This location made full use of the easy transport of stone along the river - a trade that existed from Roman times right up to the early 20th century.

SANDSTONE

As the land is eroded small particles of rock are carried away by wind and water to be deposited on river beds, in deserts or on the sea floor. Sand sized particles may accumulate to a thickness of many metres. Over time the sediment is buried, compressed and cemented into a hard rock called sandstone. Sandstone is a sedimentary rock.

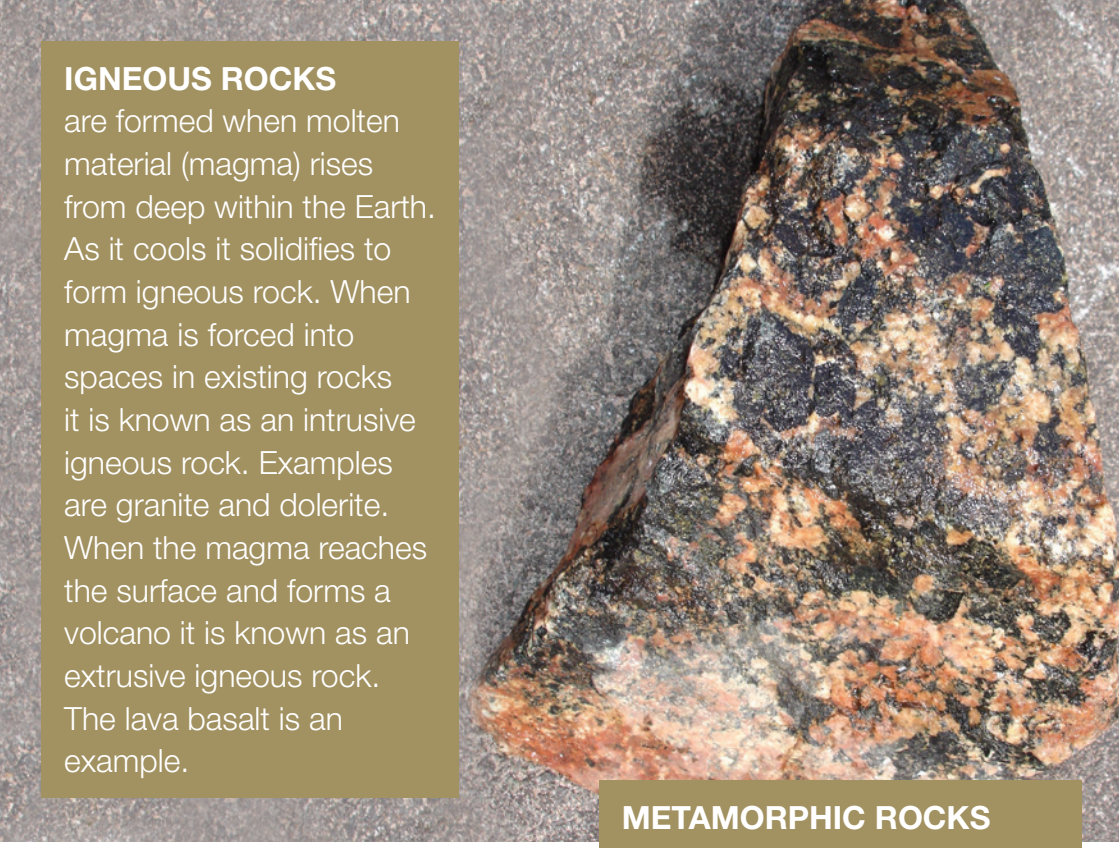
SEDIMENTARY ROCKS

Sedimentary rocks are made up of particles deposited in layers. They usually form beneath the sea, in lakes and rivers or in deserts. The particles may become cemented together by specks of mud or new minerals such as iron or calcium carbonate. Over millions of years the sediments become rock.

QUARTZ
or Silica is a mineral with the composition silicon dioxide. It occurs commonly in many different forms. It is an original constituent crystal in many igneous rocks. It forms the bulk of the grains in sandstones. It is also a prominent constituent of veins that cut through older rocks. It can be found as clear and coloured crystals such as rock crystal, amethyst and rose quartz. Silica occurs also as flint, agate and jasper.

Now climb the stairs or take the lift to the next floor and look at the rock specimens in the glass cabinets in the Archive area. Here you will see some large pebbles that have been collected from the terrace deposits of the River Severn. The terraces are the old flood plains of the river and were formed during the Ice Age.

The pebbles are of a rock called quartzite which is a sandstone consisting mainly of quartz grains. The pebbles were eroded from the solid rocks of the landscape to the north of Worcestershire, by ice and rivers over 10,000 years ago. In the same cabinet you will see a specimen of granite from the Malvern Hills. This rock is Precambrian in age and nearly 700 million years old. Granite is an igneous rock and consists of the minerals quartz, feldspar and mica.



IGNEOUS ROCKS
are formed when molten material (magma) rises from deep within the Earth. As it cools it solidifies to form igneous rock. When magma is forced into spaces in existing rocks it is known as an intrusive igneous rock. Examples are granite and dolerite. When the magma reaches the surface and forms a volcano it is known as an extrusive igneous rock. The lava basalt is an example.

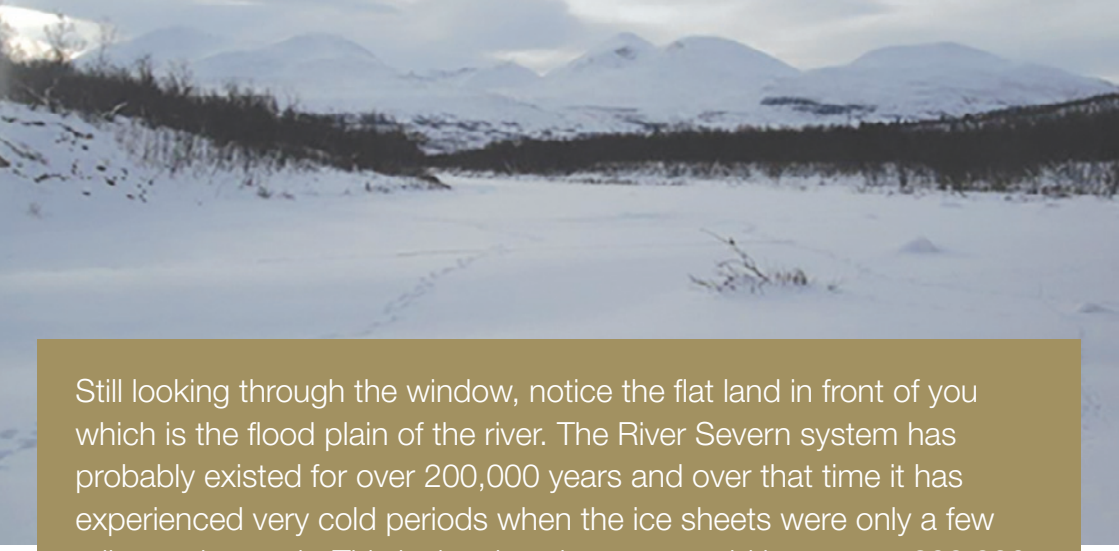
Move across to the large windows facing the River Severn. In the far distance you may be able to see the Malvern Hills. This is a range of hills composed of igneous and metamorphic rocks.

Many fractures occur in the rocks. These are called faults and are the result of earthquakes in the geological past.

You can find out a lot more about these processes by going to **www.earthheritagetrust.org**

METAMORPHIC ROCKS
These are rocks that have been metamorphosed – altered by heat and/or pressure.

The original rocks can be either sedimentary or igneous in origin. Some have been squeezed deep below the surface due to the movement of the plates that form the Earth's crust (e.g. slate and schist). Others have been heated due to the presence of molten rock (magma) as it is forced into pre-existing rock (e.g. marble).



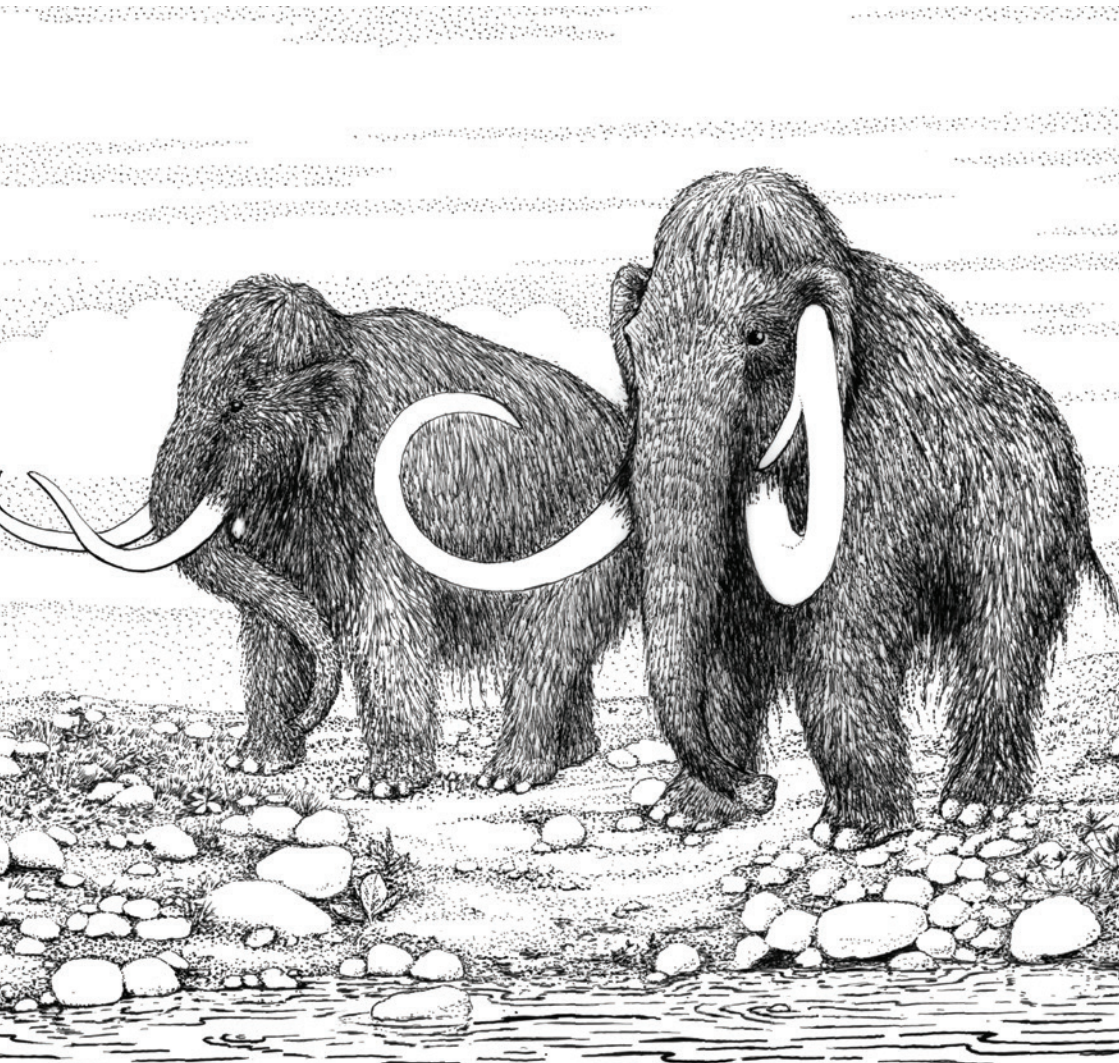
Still looking through the window, notice the flat land in front of you which is the flood plain of the river. The River Severn system has probably existed for over 200,000 years and over that time it has experienced very cold periods when the ice sheets were only a few miles to the north. This is the view that you would have seen 200,000 years ago, although the river took a different course, one of icy wastes of a Tundra landscape - similar to Siberia and northern Canada today. The remains of a woolly mammoth have been found from this time, in the river gravels that now lie under Strensham Service Station. It was probably a female around 20-25 years old, perhaps with a slight limp from an old leg injury, and life may have been tough for her and her herd in the colder years.

Other periods in the distant past were warmer. 125,000 years ago we have evidence for hippopotamus and straight tusked elephants living in the landscape. July temperatures were 4˚C above those of today, whilst average January temperatures of 1 to 2˚ C indicate that winters were mild.

The last mammoths may have died only 12,000 years ago, when the climate again warmed, to be broadly as it is today. At Condover in Shropshire, mammoth bones dating from just 14,000 years ago were uncovered. Modern humans were again living here by then. Whether humans hunted animals like mammoths into extinction or whether the changing climate caused their demise is unknown. It may have been a combination of several factors, as humans and mammoths had co-existed in previous periods without causing an extinction.

Ice ages have many causes. Variations in the Sun's energy output and in the Earth's orbit around the Sun are factors. Plate tectonics may be significant as continents are pushed to colder latitudes and landmasses are uplifted to higher altitudes, and changes in the Earth's ocean currents may be influential. Ice ages may be brought to an end by increases in greenhouse gases brought about by volcanic eruptions.

An ice age has been affecting Britain for over 2 million years largely in the geological period known as the Quaternary. There have been many glacial episodes during this time. Cold periods were interspersed with warm spells; sometimes similar to the Mediterranean climate of today.



The Hive

In the Abberley and Malvern Hills Geopark you will find outstanding geology that spans 700 million years of our Earth's history. The Geopark covers 1250 square kilometres and takes in parts of the four counties of Gloucestershire, Herefordshire, Shropshire and Worcestershire.

Abberley and Malvern Hills Geopark

We hope you have enjoyed this trail. It is one of a series. Similar short trails being offered by Geopark members can be found at Hartlebury Museum, Wyre Forest, Cob House Country Park, Bewdley Museum, Severn Valley Railway, Severn Valley Country Park and Bodenham Arboretum. To find out more about geology in the Geopark, and to download the other trails, go to **www.geopark.org.uk**

Text produced by Dr Peter Oliver of Geologists in the Geopark for Worcestershire Archive and Archaeology Service. Both are members of the Abberley and Malvern Hills Geopark Forum.

Contact us:

t 01905 766352

e explorethepast@worcestershire.gov.uk

w www.thehiveworcester.org

The Hive
Sawmill Walk
The Butts
Worcester, WR1 3PD