Callow Hill Quarry

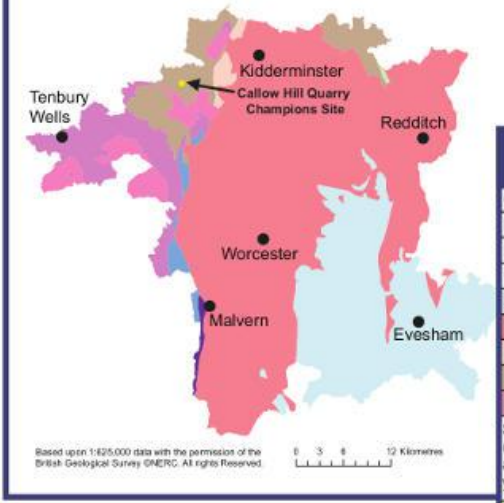
Community Earth Heritage
CHAMPIONS
project

Geological History of the Area

Ten geological systems are represented in Worcestershire:

1. Precambrian (4600 million years ago to 542 million years ago)
   - Igneous and metamorphic rocks making up the Malvern Hills and an area to the north, here they are approximately 680 million years old, and amongst the oldest in England.
2. Cambrian (542 million years ago to 488 million years ago)
   - Quartzite, sandstone and shale formed as the sea level began to rise; found in small areas adjacent to the Malvern Hills and an area to the North.
3. Ordovician (488 million years ago to 444 million years ago)
   - Volcanic material was erupted and then deposited in water during this time. At a later stage, sand deposited in a warm, shallow sea formed quartzites. Rocks of this age are found in the Lickey Hills.

Geological Map of Worcestershire



Key to Geological Map of Worcestershire

Quaternary (1.8 million years ago to recent)	
Neogene (23 million years ago to 1.8 million years ago)	
Palaeogene (66 million years ago to 23 million years ago)	
Cretaceous (146 million years ago to 66 million years ago)	
Jurassic (199 million years ago to 146 million years ago)	
Triassic (251 million years ago to 199 million years ago)	
Permian (299 million years ago to 251 million years ago)	
Carboniferous (359 million years ago to 299 million years ago)	
Devonian (416 million years ago to 359 million years ago)	
Silurian (444 million years ago to 416 million years ago)	**Pridoli stage** (419 million years ago to 416 million years ago)
	Llandovery, Wenlock and Ludlow stages (444 million years ago to 419 million years ago)
Ordovician (488 million years ago to 444 million years ago)	
Cambrian (542 million years ago to 488 million years ago)	
Precambrian (4600 million years ago to 542 million years ago)	

Location of Callow Hill Quarry

Callow Hill Quarry lies approximately 180m to the west of the Community Discovery Centre. From the Centre it is reached by a footpath within the Wyre Forest education area. (Please call in to let us know that you are visiting the Quarry). The Wyre Community Discovery Centre is located at the southern border of the Wyre Forest, behind the Visitor Centre, just off the A456 at Callow Hill.

4. Silurian (444 million years ago to 416 million years ago)
   a. Pridoli stage (419 million years ago to 416 million years ago)
      - Mudstones, sandstones and calcretes (calcium-rich fossilised soil) deposited within a flat, arid landscape near the coast, crossed by seasonal streams.

   b. Llandovery, Wenlock and Ludlow stages (444 million years ago to 419 million years ago)
      - At the start of the period, sandstones and conglomerates (sediments containing rounded pebbles) formed from the material brought down into a shallow sea during flash flood events. Then limestones and shales formed as the sea level rose.

5. Devonian (416 million years ago to 359 million years ago)
   - Sandstones deposited by streams in an otherwise flat arid landscape. These rocks are found in the west of the county around Tenbury Wells.

6. Carboniferous (359 million years ago to 299 million years ago)
   - Clays, coals, shales and sandstones formed in a flat, swampy delta, which experienced frequent flooding as the sea level rose and fell. These rocks are found around the Wyre Forest Coalfield area. There are also igneous intrusions of this age found in the Teme Valley and near Kidderminster.

7. Permian (299 million years ago to 251 million years ago)
   - Red desert sandstones. At the start of the period, breccias (sediments containing angular fragments) formed during catastrophic events such as flash floods or earthquakes. These rocks are found in small areas in the north and west of the county.

8. Triassic (251 million years ago to 199 million years ago)
   - Sandstones, conglomerates, evaporites (salts), breccias and mudstones representing a change in environment from a flat, arid landscape covered in rivers and lakes, into oceanic conditions.

9. Jurassic (199 million years ago to 146 million years ago)
   - Limestones and mudstones deposited in a warm, shallow sea. These rocks are found in the east of the county from Redditch to the Cotswold Hills.

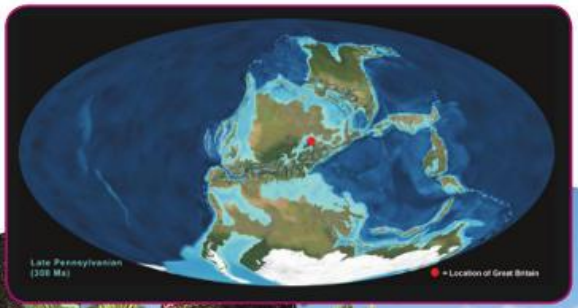
10. Quaternary (1.8 million years ago to recent)
    - Glacial deposits, river sands, gravels and alluvium, and chemical deposits such as tufa, overlying the hard rocks (but not shown on the geological map).

Geological History of the site

▶ Capetus

The rocks seen at Callow Hill Quarry were formed during a period of time known as the Carboniferous, approximately 310 million years ago. At this time the layout of the oceans and continents across the Earth was very different from today. England and Wales were part of the supercontinent of Pangaea just south of the equator. Most of the world's land surface was then centred on the equator. The environment and landscape then differed greatly from that seen today. It was a dynamic mixture of tropical forests, swamps and sandy deltas fed by rivers that frequently flooded. This dynamism is reflected in the variety of rock types seen both in Callow Hill Quarry and its immediately surrounding area.

The Carboniferous swamp environment was probably similar to a modern day equatorial forest. The trees, however, were a mixture of primitive types, lacking the flowers of their modern counterparts. They were mostly fern-like or else giant predecessors of the present-day horsetails, which grew up to 10m tall. There were huge dragonflies with a 1.5m wing-span and amphibians like giant newts that were still dependent on water for breeding.



▲ Carboniferous Palaeomap
Image copyright to Ron Blakey, Colorado Plateau Geosystems, Inc

▼ Carboniferous Forest
Image courtesy of John Watson

What rock am I?

Fossil of Meganeura, an extinct Dragonfly

Did you know?

The Carboniferous Period gets its name from the Latin word for coal, carbo; Carboniferous means 'coal-bearing'. Many coal beds were laid down globally during this period, hence the name.

All rocks can be divided into three main groups; Igneous, Metamorphic and Sedimentary. The rocks seen in Callow Hill Quarry are all Sedimentary.

Sedimentary rocks make up about three-quarters of the rocks seen at the Earth's surface. A sedimentary rock is formed when older rocks are broken down by wind, water or ice (the process of erosion) into particles (tiny fragments); accumulations of these particles are known as sediments. Sediments, such as sand and mud, collect at the surface in environments such as beaches, rivers, the ocean and deserts. Sometimes the hard shells or skeletons of dead animals may be preserved within the sediment; these are called fossils.

Sedimentary rocks preserve a record of the environments that existed when they formed, for example beaches, rivers or deserts. By looking at sedimentary rocks of different ages, geologists can figure out how the climate and environments have changed through Earth's history.

The Sedimentary rocks seen in the quarry are sandstone and conglomerate.

Sandstones are made up of sediments containing grains of sand. The sand is gradually pressed together as more and more sediment builds up on top. The individual grains of sand then get cemented together by either mud or other minerals (e.g. iron compounds or calcium carbonate) carried by water trickling through the gaps between them. The mud or minerals build up between the grains, filling the gaps, and cementing them together. Eventually, after millions of years, the compacted sand becomes a rock known as sandstone.

Conglomerate

A conglomerate forms in a similar way to sandstone but also contains large, rounded water-worn pebbles or boulders set within the sand. The rounded pebbles found within a conglomerate come from areas of high-energy water such as in fast flowing rivers or on the beach - anywhere that the movement of the water is strong.

The combination of the pebbly conglomerate and the sandstone in this quarry tells us that the sediment was originally deposited in a river which was occasionally in flood. Plant fossils have also been found within the sandstone in this quarry. This tells us that there were plant remains floating in the water or growing in the sand.

Horsetail fossil

Sandstone

Biodiversity

Wyre Forest's 2,500 hectares are all that remains of a forest which once stretched along the Severn Valley from Worcester to Bridgnorth. It is one of the largest semi-natural ancient oak woodlands in England, as important ecologically as the Forest of Dean and the New Forest. Its geographic position and underlying geology have created a diverse range of habitats, and many species are at their northern or southern range limits.

A visit to the Wyre Forest will often reward you with glimpses of fallow deer as well as the more common foxes, badgers and hedgehogs, but rarer animals include polecats, otters and dormice.

There is a fantastic variety of birdlife including chiffchaffs, nuthatches, treecreepers, owls, sparrowhawks and all three species of woodpecker, as well as rare wood warblers, woodcocks and kingfishers. Even crossbills may be found feeding amongst the conifer trees. The Wyre Forest is especially important for its insects. These are often overlooked, yet their importance at the bottom of the food chain is crucial for so many of the other creatures. The Wyre Forest is one of the best places to see butterflies and moths in Britain - the total species list for the Wyre Forest is almost 1200, nearly half of the total number of butterflies and moths found in Britain. The pearl-bordered fritillary and wood white butterflies, found in Wyre, are undergoing catastrophic decline nationally. Wood ants are also very common - look for their massive nests!

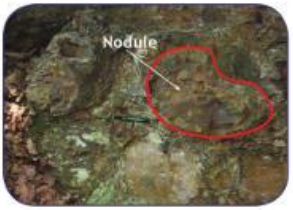
This shallow quarry is an open habitat surrounded by oaks, birch and hawthorn. Growing in the clearing are bramble, bracken, bluebell and various fern species. The low rock faces support wood sage, heath speedwell and mosses. Common lizard and slow-worm may be found warming themselves here on summer days. The sheltered nature of the clearing and features such as the fractured rock face provide optimum conditions for many invertebrates. On warm summer days the variety of insects, especially bumble bees, feeding off the nectar of bramble flowers is an amazing sight - and sound!

Did you know?

It is thanks to the poor, thin acidic soils, generated from the underlying rocks and clay that the forest still remains. Better soils could have led to it being cleared for agriculture many years ago.

▲ Bramble on the quarry floor surrounded by Oak trees

Archaeology



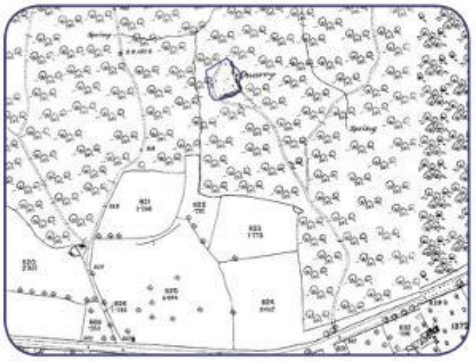
A palaeosol containing iron nodules

There is a long history of quarrying within the Wyre Forest. Callow Hill Quarry is slightly unusual as it appears to be an isolated quarry, rather than one of a group. This suggests that the stone was extracted from this site for a specific purpose rather than on an ad hoc basis.

The sandstone and conglomerate here was likely used as an aggregate such as roadstone for local roads and trackways, and for use in building foundations and possibly as a small-scale walling stone.

Alongside the sandstones and conglomerates, the quarry face displays bands of fossilised soils known as 'palaeosols'. These formed during periods when the ground became swampy and waterlogged. Such soils were subsequently buried and underwent complete oxidation giving the beds their red colour, the same process seen when iron rusts. Iron-rich nodules within the palaeosols were also oxidised during burial and formed haematite (iron oxide) as a result. These iron-rich nodules may also have been quarried to be used as a source of iron ore for the (documented) local iron industry.

The first and second edition Ordnance Survey maps show two extraction trackways running around the quarry and meeting at the southern end of the quarry before heading southwards towards the road. The third edition map, produced in 1927, does not show these trackways, and indeed they are hard to find today. This suggests that the quarry had fallen out of use by this time.



▲ 1st edition OS map dated 1884, showing quarry (blue line) within the Wyre Forest

▲ 2nd edition OS map dated 1903, showing quarry (blue line) within the Wyre Forest

▲ 3rd edition OS map dated 1927, showing quarry (blue line) within the Wyre Forest

Did you know?

There are over 1200 archaeological features in the Wyre Forest, dating from prehistory to World War 2. Many features reflect the forest's industrial past. These include medieval iron workings, 17th century coal pits and some ancient stone quarries

Carboniferous swampscape.
Image courtesy of Ludlow Museum

Cochleosaurus

what is the Community Earth Heritage CHAMPIONS project?

The Community Earth Heritage Champions Project, funded by the Heritage Lottery Fund, and Natural England through Defra's Aggregates Levy Sustainability Fund, has involved communities across Herefordshire and Worcestershire.

Each of the nineteen geological sites chosen for the project has a Champions community group carrying out conservation work, promoting the use of the site to other people in their parish and monitoring the site for any changes in condition.

The idea of the project is to take a holistic view of the environment and to understand the relationships between geology, ecology and archaeology.

The Champions have received training in a number of subjects in order to understand the features observed at their site; knowledge which they will now pass on to new volunteers. The conservation work being undertaken will help to ensure the protection of these important features and enable people to enjoy the natural world for years to come.

Community Conservation Champions

heritage lottery fund
LOTTERY FUNDED

NATURAL ENGLAND
Supported through Defra's Aggregates Levy Sustainability Fund

For more information about the project, or any aspect of the work carried out by the Herefordshire and Worcestershire Earth Heritage Trust, please contact us at:

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