



SHAVERS END QUARRY



Community Earth Heritage
CHAMPIONS
project

GEOLOGICAL HISTORY OF THE AREA

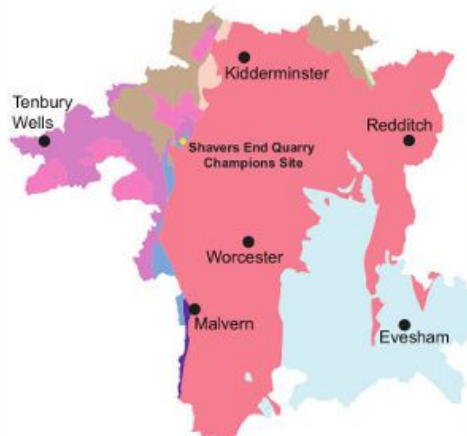
Ten geological systems are represented in Worcestershire:

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



Based upon 1:625,000 data with the permission of the British Geological Survey ©NERC. All rights Reserved.

0 3 6 12 Kilometres

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 Shavers End Quarry

How to get to Shavers End Quarry: The quarry is located on a small B road that links the village of Abberley and the A451. The B road is named "Wordley Lane" off the A451. When approaching through Abberley village the B road is opposite the Manor Arms pub.



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 calcrites (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



▲ Brachiopod (*Atrypa reticularis*)

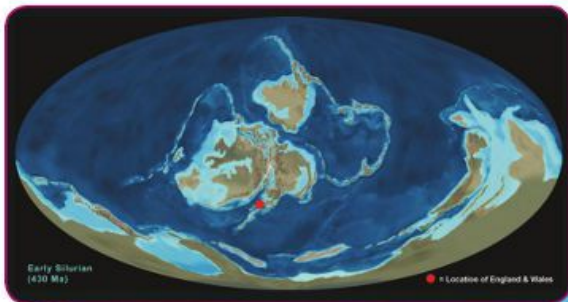


▲ Brachiopod fossil found in Shavers End Quarry (each line on scale represents 0.25cm)

The rocks seen in Shavers End Quarry formed during a period of time known as the Silurian, approximately 420 million years ago. At this time the layout of the oceans and continents across the Earth looked very different and England and Wales were part of a microcontinent called Avalonia which was located in the southern tropics.

During the Silurian period most of the midlands was covered with a warm, shallow tropical sea, much like that seen in the Seychelles today. These conditions were an ideal home for many different types of sea creatures including trilobites, brachiopods, bivalves, corals and crinoids which can be found fossilised within the limestone in the quarry. The remains of all of

these creatures fell to the sea floor shortly after death; their shells helping to form calcium-rich sediments. These sediments were compacted over a long period of time and eventually formed the limestones we see today. The limestones seen in Shavers End Quarry are part of the Aymestry Limestone Formation.



Early Silurian (420 Ma)

● Location of England & Wales

▲ Silurian palaeomap
Image copyright to Ron Blakey, Colorado Plateau Geosystems, Inc

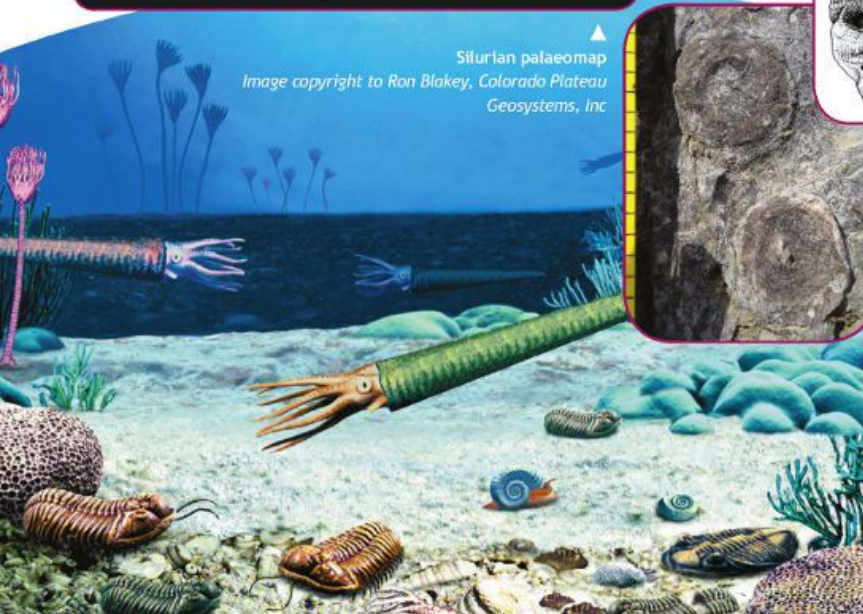


▲ Coral (*Kodonophyllum truncatum*)



◀ Coral fossil seen in the rock face at Shavers End Quarry (each line on scale represents 0.5cm)

◀ Silurian seascape
Image courtesy of John Watson



THE GEOLOGICAL STRUCTURE

Did you know?

Trilobites, although now extinct, were a very successful group of animals existing for 300 million years. They are related to crustaceans such as lobsters and crabs, having hard shells, segmented bodies and jointed legs. They were also among the first creatures to develop complex eyes.



Real Trilobite Fossil
(approximately 5cm long)

Millions of years after they formed, the rocks that make up Shavers End Quarry were folded (bent) and faulted (broken). This was due to the collision of two large continents, which squeezed the land together forming mountains; an event known as the Variscan Orogeny that started in the Devonian period (approximately 416 million years ago) and reached its climax during the Late Carboniferous period (approximately 316 million years ago).

These earth movements were so intense that the

rocks, which originally formed in horizontal layers, were tilted until they were vertical and even overturned. The faulting (breaking) and folding (bending) pushed up older (buried) rocks to the surface along a roughly north-south line called the Malvern Axis. This event not only formed the Abberley Hills, but the Suckley and Malvern Hills as well. Since then the rocks have been eroded (broken down) to form the ridge line we see today.

Structure of
Shavers End
Quarry

The rocks originally
formed in flat layers



Aymestry Limestone
Formation

The rocks were then
folded over during the
Variscan Orogeny



200m

Faulting and erosion removed the rocks at the surface, cutting down to expose the Aymestry Limestone

West northwest



Fault

East southeast

BIODIVERSITY

When quarrying finished, the landscape was mainly bare rock cut out from the once wooded hillside. It is an unforgiving environment, being limestone rock with little soil - and very prone to drying out and also flash floods. Now plants are re-establishing themselves and starting to clothe the area once again. The first plants to arrive were the Silver Birch, always an early coloniser. Sycamore and Ash seedlings from the woodland above are getting a hold on the quarry sides, where the climbing Traveller's Joy with its fluffy seed heads in autumn, and Red Valerian with spikes of red flowers in spring are also starting to make their home.

On the lower open ground, Wild Strawberry is becoming established, as well as Colt's foot with its yellow flowers in March and large leaves for the rest of the year. Perforate St. John's-wort is also an early arrival in this habitat and is becoming quite extensive in places. Other rarer flowers to look out for are Wild Basil, Glaucous Sedge, Heath Speedwell

and Ploughman's Spikenard, which are adapted to withstand these harsh conditions and should increase in frequency over the years.

As yet, the pools are sparsely vegetated with only the occasional floating pond-weed, plus a few species at the margins such as Pendulous Sedge and Reedmace with some Willowherb and rushes.

As the soil builds up though leaf litter from the neighbouring woodland, helped by worm and other animal action, the vegetation will increase and the area will become much less bare and could well support different species of plants. The insect population should build up and the birds and other predators will follow.

Although it looks very peaceful, this is a dynamic situation and regular visitors will see it change over the years.



© AJ Silverside

Did you know?

Traveller's Joy is also called Old Man's Beard and is a wild Clematis (*Clematis vitalba*). It only grows where there is a lime-rich soil and its flowers provide food for the larvae of several moth species.

▲
Clematis vitalba
Photo courtesy of
Alan Silverside

ARCHAEOLOGY

Although Shavers End Quarry was recorded as a quarry on the Ordnance Survey map as far back as 1903, official permission to quarry commercially was not granted until 1951 with an extension in 1986.

The quarry was last worked by ECC Quarries Ltd (a company now owned by Aggregates Industries Ltd), with quarrying finishing in 2002. The limestone from the quarry was used in the construction and aggregates industry for roadstone and foundation fill.

The photos show the remnants of the machinery used in the quarrying process.



▲
Remnants of the stone crusher loading point
stone was tipped from the trucks into the stone crusher at this point
▼



▲
Remains of an electricity sub-station



►
Remains of the weigh bridge



Did you know?

Despite being a well used aggregate quarry, Shavers End Quarry actually began its life as a small lime kiln. Until the 1920s lime-burning, although small scale, was widespread; the remains of hundreds of limekilns can be seen all over Britain.



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.



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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