walking through the past

St. Chad's Churchyard at Over in Winsford Geodiversity

What does the Cheshire RIGS group do?

Cheshire RIGS recommends sites to local authorities for designation as Regionally Important Geodiversity Sites. It also works in partnership with other community groups and businesses as part of the Cheshire region LGAP (Local Geodiversity Action Plan) to maintain geodiversity in Cheshire.

For more information about Cheshire RIGS or if you are interested in becoming involved with RIGS please contact Cheshire RIGS at either the Grosvenor Museum, Chester, or via the website www.cheshireRIGS.co.uk or email c.burek@chester.ac.uk

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Rock types found in St. Chad's Churchyard

The rock types you will see while walking around the churchyard are igneous, sedimentary, metamorphic and man-made. They have different characters and were carefully chosen by each generation, depending on their availability at the time.

Igneous

These form when hot magma rises near, or onto, the Earth's surface. The varied cooling rates, and chemical composition, of the magma causes it to crystallize into different types of igneous rock.

Sedimentary

A rock formed by the build-up of weathered rocks and fragments of plants and animals (which become fossils). Often deposited in layers in deserts, and by the sea and rivers; they are then compressed and stuck together.

Metamorphic

These are rocks that have been altered by heat and/or pressure into a new, much harder rock with the same chemical composition.

Man-made - rocks

These include concrete, tarmac, and clays which have been baked to form bricks.

The rock cycle

Rocks form part of a continuous cycle called the rock cycle.

Igneous rocks form when hot magma solidifies.

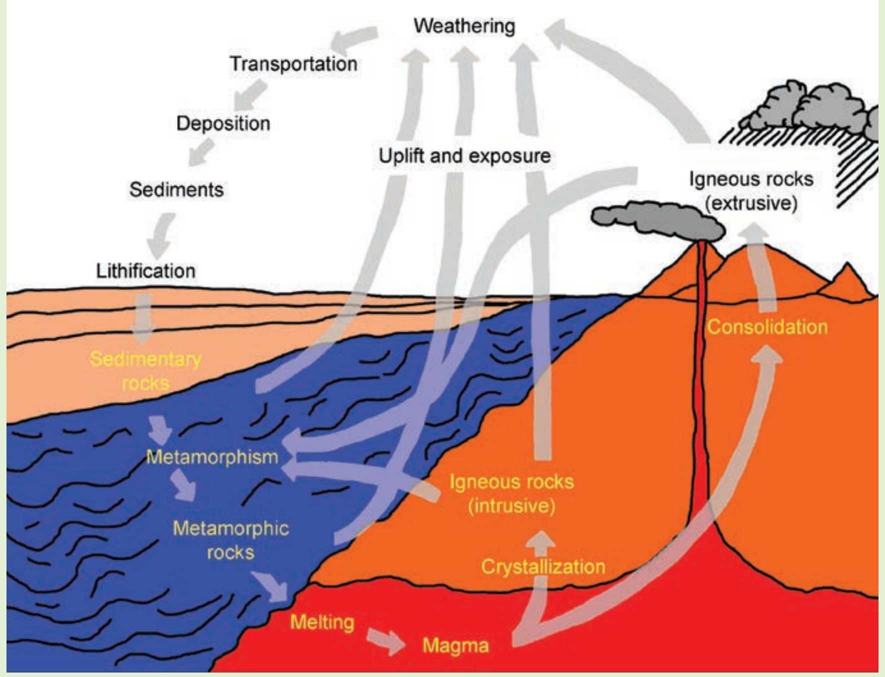
When they are exposed at the surface they are worn down into tiny pieces by physical or chemical weathering.

These fragments are carried by wind or water out to the sea, where they settle in layers; sometimes they may settle in deserts or rivers.

As these layers are buried and compressed, they are stuck together with minerals and turned into rocks. These are sedimentary rocks.

Sedimentary rocks are either worn away to form new sedimentary rocks or altered into metamorphic rocks.

Metamorphic rocks are rocks that have been altered by heat and/or pressure into a new, much harder rock, with the same chemical composition.



Exposed metamorphic rocks are weathered into sedimentary rocks while those that are altered by enough heat and/or pressure become hot magma, and the cycle begins again.

The Geological History of the Cheshire Salt Landscape

The landscape of Winsford is a combination of rocks formed 220 million years ago (Triassic Period) in hot, arid, desert conditions with playas or salt lakes, leaving us the salt deposits we exploit today and Ice Age sediments formed under freezing and thawing conditions of the last 2 million years (Quaternary). When the ice eventually melted about 17,000 years ago it left behind glacial moraine or till, clay, sand and gravel over the Triassic salt-bearing mudstones and cut deep river valleys, such as the River Weaver.

The River Weaver is in a fault controlled valley. The Winsford Fault, occurs between St Chad's Church and the River Weaver stretching north to south from the traffic lights near Town Park on the High Street in Winsford to Church Minshull.

East of the Winsford Fault, the Triassic Northwich Halite (rock salt) is close to the surface and the water table, (the wet rockhead). Here natural brine springs were exploited, brine wells sunk and rock salt mined. One salt mine still operates at Meadowbank. Due to salt extraction, the Weaver Valley and old Winsford town close to the river suffered massive ground collapse with large areas flooding to form the Top Flash and Bottom Flash.

The new town of Winsford was sited west of the Winsford Fault to avoid the subsidence area. Here the Northwich Halite is deeper, covered by mudstone forming a stable impermeable (does not allow passage of water) roof, (the dry rockhead).

St. Chad's Church and Churchyard in Over is situated on high ground west of Winsford overlooking the low ground of the Weaver Valley. Over was the original settlement, recorded in the Doomsday Book and Winsford developed as a Salt Town in the 19th century.

St Chad's Church and Churchyard are on a ridge that was originally a glacial meltwater drainage channel - the Over Sands ridge. The channel flowed southwards into the River Severn from a major ice sheet which came from the north – Scotland, Lake District, Irish Sea, and advanced over Cheshire spreading glacial tills.

17,000 years ago as the climate warmed the glacier started waning and vigorous meltwater streams cut through the basal layer of the till to bedrock, seen in places such as the banks of the River Weaver at the A54 Winsford Bridge. Later the channels were filled with sand and gravel outwash. One of the channels is the Over Sands ridge - which slopes southwards from a crest of 66m at Over to 52m at Church Minshull, roughly along the line of Swanlow Lane / B5074.

As stagnant ice and ice-cored moraines around the sand filled channel melted and collapsed, waterlogged till slid down into the channel to form a clayey layer capping to the sand. These channels were left as upstanding ridges – an inversion of topography. The channels are now 15 or so metres higher than the plain. This gives an explanation for the name Over which is the settlement on the ridge, and comes from the Anglo Saxon Ovre meaning higher or above. Gullies drain east off the Over Sand Ridge down to the River Weaver.

St Chad's Church is in one of these gullies, just at the eastern edge of the old sand filled glacial meltwater channel. The clay capping above the sands impounds water within the sands, which are both porous (water bearing) and permeable (allow movement of water). The streams in the gullies are fed by springs from the sands, which also filter the water. The springs are extremely constant even in dry weather giving support to the story that St Chad's Church may well be at the site of earlier pagan sacred wells and springs. Many churches dedicated to St. Chad are associated with wells or springs.

The sandy soil that you see in the lower ground immediately surrounding St Chad's Church is the glacial meltwater channel sands of the Over Sands ridge.

St. Chad's Churchyard

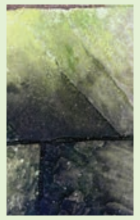
The Churchyard is closed from dusk to dawn.
Dogs must be on a lead. Please close the gates.

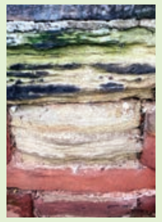
Churchyard Trail. This walk takes about an hour.

Start just outside the gates of the churchyard at Stop 1 on the map

The entrance to St. Chad's churchyard displays all four major rock types. The gate posts themselves are made of local Triassic red sandstone containing iron giving a distinctive colour, suggesting it originated in a hot, arid desert environment. To the right, the lower blocks are at right angles to the original bedding as the beds are vertical not horizontal as they would have originally been laid down by a flowing river.

1 On the same pillar is a slate plaque, a metamorphic rock formerly a mudstone. Slate is also visible as roofing material on nearby buildings. To the left of the entrance and in front of the house are some cobbles, including igneous granites. These were brought by ice from the Lake District, then picked up from rivers or glacial material.





The paving is older Carboniferous Namurian sandstone with ripple marks on some of them. The graveyard wall is both red and yellow showing two different sandstones. The difference in weathering suggests that the red one is better cemented than the pale one.

Manmade construction materials as well as natural rock are used in this locality. These include tarmac, concrete and brick. Tarmac, used for the road up to the gates, is made of hydrocarbons mixed with igneous chips to form a solid surface. Concrete is used for the war memorial. Bricks made from fired clay are used for the cottage buildings. Pink coloured bricks probably have higher iron content, while pale bricks have higher lime.

Go through the gates and immediately turn left and follow the pathway. Look to the left.

2 Ann Carey's headstone (1881) is a Carboniferous Namurian sandstone with shiny small flakes of the mineral mica. This is very weathered as compared to the better cemented gravestone of William Warburton (1882), which is closer to the cottage.

Carry on walking past the corner of the church and look at the wall of St. Chad's on the right.

3 Many church wall blocks contain red Triassic sandstone with 'nobbles' where the sand grains are cemented by barytes, a very dense, heavy mineral. Pebbles and cross bedding structures suggest that the sands were waterlain as cross bedding forms when river currents change direction laying beds at different angles.

Walk along the path between the low sandstone wall to the left and church to the right.

Follow the path around the corner of the building and on the left you will see the well.

4 It is unusual to find a well in a churchyard. This one has local red sandstone walls. The position of wells in the landscape is related to the underlying geology. Here it is sunk into water-bearing glacial outwash sands (Quaternary Over Sands) that form the core of the ridge on which the settlement of Over is built. St Chad's Church is in a gully leading down to the River Weaver. This cuts through an upper clay-rich till, down to the outwash sands and underlying older glacial moraine. The springs along the junction of the sands and clays are reliable even in dry weather.

Walk over the grass uphill towards the tall ornate cross shaped memorial.

The grave of George Stubbs has a rough cut granite headstone showing the three diagnostic minerals making a granite. The colourless quartz, the white feldspar and the shiny sellotape-like mica. Close by, the memorial for Ann Shinkfield shows the use of contrasting ornamental granite columns on a sandstone headstone. It is probably related to historical transportation costs of the rock types with sandstone being the cheaper more local rock.

5

Walk about 10m uphill over the grass.

Mary Elizabeth Moss Dean's headstone contains two granites of different coloured feldspars. These crystallise at different temperatures and have a slightly different chemistry. They are aluminosilicates (composed of aluminium, silicon and oxygen) but have different elements (e.g. potassium, calcium) responsible for the different colours. Pink orthoclase forms at lower temperatures and has a chemical formula including potassium ($KAlSi_3O_8$). The white feldspar, plagioclase, contains either calcium or sodium.

The granite columns look like the popular monumental stone named Balmoral Red which is quarried near Vehmaa-Taivassalo in Finland.

6

Walk uphill to the second mowed path and then turn left for a short distance walking towards a distinctive white headstone on the right.

The military grave of Sargent A. F. Fitton, Air Gunner. Military Graves from the First World War onwards are made of the same material. When headstones were first chosen after WWI (Feb. 1918), 'Equality' was the underlying principle behind the design. All have curved tops and only bear a national emblem or regimental badge with rank, name, unit, date of death and age of each casualty above an appropriate religious symbol plus a more personal dedication chosen by relatives. So a key requirement was to choose a stone that was easy to carve and to care for. Thus British service personnel headstones were always identical and made from Portland Stone, a durable and affordable, fine, oolitic Jurassic limestone from Dorset. An oolith is a small round grain formed in shallow tropical seas as layers of calcium carbonate are deposited around a shell fragment or sand grain. If you look closely at the surface, you will see ooliths as well as fossils. This military grave also shows zigzag markings called stylolites. These are pressure solution features formed after lithification, as carbonate sediments compact under pressure.

7

At the end of this row next to the fence, Francis May Walker's headstone is made of marble. This metamorphic rock is produced when a limestone is altered by heat and pressure. Marbles have a sugary, granular texture; pure forms are white but here the grey streaks are produced as non-carbonate material was incorporated into the original rock.

Walk back along the mown path to the paved path and stop at the crossroads.

The headstones of Jane Williams and Walter Leak are iron-rich, basic igneous rocks but of different grain size indicating that they cooled differently.

8 Jane Williams' grave has a gabbro headstone. This has large crystals which formed as the molten magma slowly cooled, allowing the crystals to grow at depth within the crust. Walter Leak has a dolerite headstone. Here crystals cooled more quickly, closer to the surface, they are smaller, but still just visible to the naked eye.

Turn left up the surfaced path until you come to the junction with the narrow paved path. The next stop is on your left.

9 The grey-green headstone of Jane Robinson is a Borrowdale Volcanic tuff from the Lake District. This rock is formed when solid volcanic material of ash size or larger, is ejected out of a volcano and settles down through the air into beds in which the coarsest material settles first. So it is an igneous volcanic rock which settles using sedimentary processes.

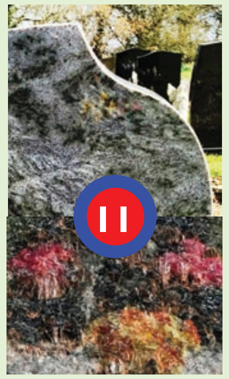
Nearby in the next row is Geoffrey Allan Carden's grave made of a high grade metamorphic rock - a gneiss. Swirling bands of flowing, aligned minerals called foliation, are created by the effects of direct, very intense heat and/or high pressure. The rock almost melted but didn't. The grave is covered with low grade metamorphic slate chips, the two colours show the origin of the rock with green coming from the Lake District and purple from North Wales.

Continue along the row to its end.

On the higher parts of the graveyard away from the church, the ground is often waterlogged. Why? The land here is underlain by clay-rich impermeable glacial till which prevents water soaking down to the sands beneath the clay. The waterlogged ground around the graves of the Shawcross family are shown after heavy rain.

Continue along the surfaced path crossing the top of the churchyard. Look to the right.

10 The headstones of Charles and Charles Ronald Jones are made of larvikite. This attractive igneous rock (only found in the Larvik region of Norway) is often polished and used in modern headstones. The large phenocrysts are iridescent and change colour between blue and silver when looked at from different angles. This is the Schiller effect. The blue shimmer on the crystals is due to microscopic changes in the unstable crystal structure due to pressure changes as it was pushed to the surface. The rock formed 30km underground by the cooling of magma from the breakup of the Pangea supercontinent (295 million years) during the Permian/Carboniferous periods.



11 Thelma Lamb's headstone of gneiss shows deep red crystals (garnets) which signifies high grade pressure conditions in the lower parts of the crust and mantle, next to this is the headstone of Mary Hough showing excellent cleavage on the pink feldspars crystals in a granite.

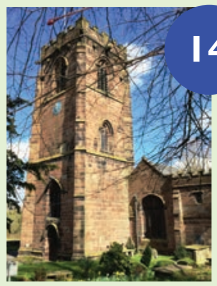
Continue along the path.

12 Immediately next to the path on the right, Amelia Ravenscroft has a carved and polished dolerite headstone. The difference between the two stone mason's finishes is evident.

As you walk around the path back down towards the war memorial corner look out for examples of the rock types you have seen – try to identify them as you go.

13 Thomas Rothwell McDean has a dolerite headstone and a white granite base. The difference in crystal size shows the different relative speeds of magma cooling and the colour reflects the rock geochemistry. In this case the darkness reflects the higher iron content of the minerals.

At the junction take the path to the right, circling uphill, until you reach the bench.



14 The church has a slate roof. Slate is often used as roofing material as it is impervious and lighter than other materials, it can also be cut very thin because of the rock's cleavage. This is fairly easy to do by hand but today it is generally done by machine.

This is the end of the guided trail. Explore further and see other headstones showing the described features.

We hope you enjoyed the excursion around St. Chad's Churchyard at Over in Winsford.