

GEOLOGY AND SCENERY OF NORTH SHROPSHIRE

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To the inhabitants of Somerset and its surrounding counties, the Somerset Levels are a familiar locality and, particularly to those people who are interested in bird watching, natural history, local history and walking, is a valuable and treasured environment. However, this environment is not as natural as one would expect but has been reclaimed from the sea through a long history of human habitation and activity

and in the 17th century, by the Dutch. There has also been extensive construction of rivers and canals over the centuries, such as the Kings Sedgemoor Drain, draining the water from the Levels using, in earlier days, windmills but in modern times, steam and now electric pumps to raise the water from the low lying rhynes and ditches into the rivers Parrett, Brue and Axe and thence into the Bristol Channel.

Two hundred or so miles north of the Somerset Levels is another area of bogs and lagoons which have their own unique history. The Meres and Mosses of

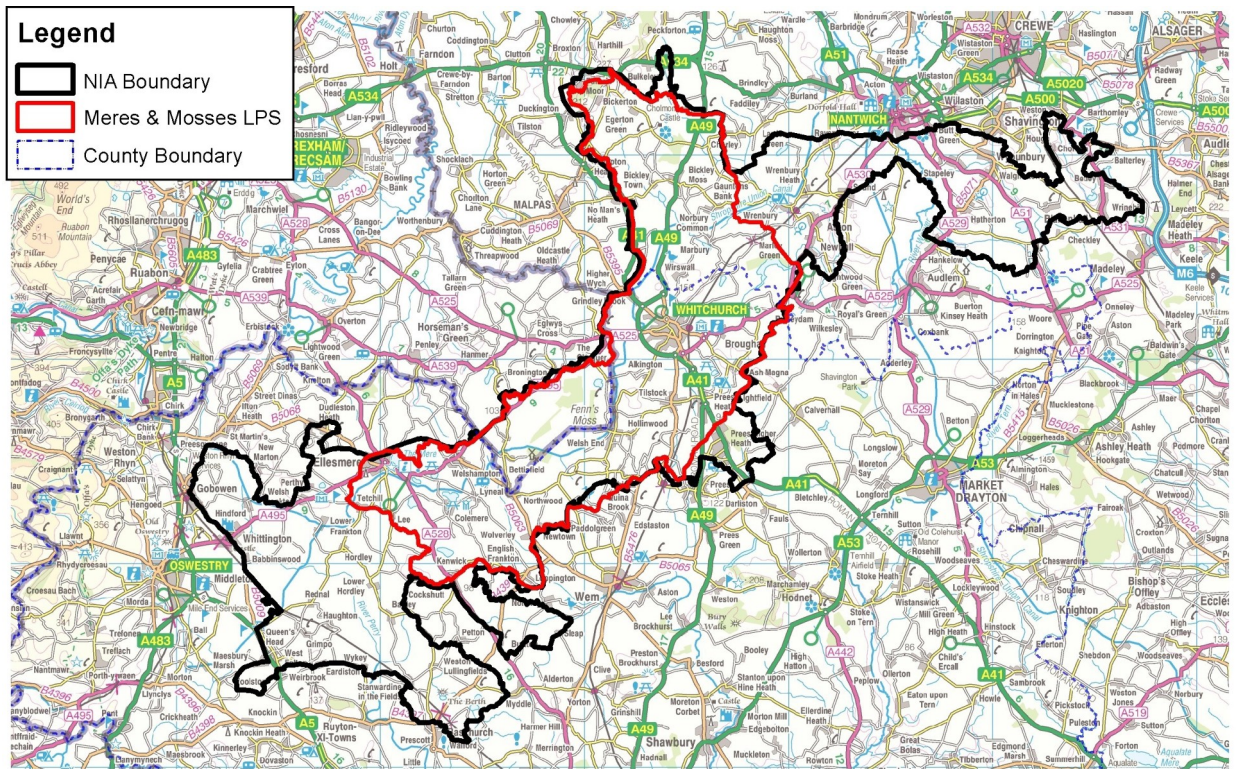


Fig 1, Map of Mosses and Meres

with, in particular, peat extraction over the last two centuries. It is through the efforts of the wildlife conservationists, ecologists and the farming community that selected areas of the Levels are returning to something like their original form. Where the peat has been extracted extensive lagoons and lakes have been formed to provide important habitats for birds. However, what makes the Somerset Levels unique in Great Britain is that they are, in general, below sea level. Since well before the Dissolution of the Monasteries the sea has been prevented from flooding the low lying land by banks and defences that were built by the monks

the counties of Shropshire, Cheshire, the western edge of Staffordshire and small areas of the Welsh Borders are the second largest natural network of pools and wetlands outside the Lake District, centred on Shrewsbury, Baschurch, Ellesmere and Whitchurch in north Shropshire and south Cheshire. (Fig 1) They are lowland raised bogs, the third largest in Britain, formed by a process and exhibiting features which are distinctly different from the Somerset Levels. The Somerset Levels are criss-crossed by rhynes (water filled ditches and channels) that divide the land into

fields, woods, and marshes each feeding into larger channels, canals and rivers. The Mosses do not have the rhynes although there are a few waterways which drain the bog areas. However, the main difference is that the water table is much higher so that, particularly during wet periods, the Mosses are waterlogged and treacherous to walk across unless one is very familiar with the safe tracks. At all times of the year, there are numerous lagoons and pools which are home to birds, insects, amphibians, reptiles, mammals and a wide range of flora.

Another feature is that there are large areas of the Mosses where Sphagnum moss is actively growing. Indeed, in recent years conservation projects have reversed the effects of centuries of peat cutting by the active encouragement of Sphagnum Moss to grow and produce new peat beds.

Another feature of the area is the Meres of which the largest is Ellesmere, giving the town on the water's edge its name. Close by are the smaller meres of Colemere and Blakemere while there are six more elsewhere in Cheshire and Shropshire and



Fig 2, *Glacial Erratic*

one near Stafford. A mere is an expanse of water which, unlike a lake, is not fed by or releases water through streams or rivers, but is maintained by the water table and runoff from surrounding land.

During the Ice Age at its maximum, between 18-19000 years ago, the most southerly limit of the ice sheet followed a line roughly west to east from Church Stretton to Wolverhampton. There were two main ice sheets from different directions that entered Shropshire, the larger



Fig 3, *Flint Glacial Erratic*

originating in south west Scotland and the Lake District and moving south through the Irish Sea and Cheshire Plain. Although the ice retreated northwards, cold conditions prevailed for a long period with occasions when there were advances of the ice during colder periods. It was during these colder times that the other ice sheet from north Wales moved across the northern and western parts of Shropshire. The effect of these ice sheets was to deposit huge amounts of glacial drift as a blanket of gravels and unconsolidated sands over the underlying Permian, Triassic and Jurassic bedrock. Glacial erratics of granite, sandstones, flints (probably from Cretaceous beds on the floor of the Irish Sea) and other igneous rock such as tuff can be seen all over the area particularly around the margins of the meres. (Figs 2 and 3) Over the years, many of these erratics have been dug up by the plough and can be seen as features in gardens. The meres are thought to have been formed as 'kettleholes' where large blocks of ice had been left by the retreating glaciers, covered by moraine and then melted to produce deep depressions which then filled with water. An alternative but similar process has been suggested, that ice lenses formed in the deposits under the ice, forming raised areas ('pingoes') which, when they melted, collapsed into water-filled depressions.

In the past, the Mosses of Shropshire and Cheshire have been more extensive than they are now. Currently, the main bog, a National Nature Reserve, is composed of Fenn's, Whixall and Bettisfield Mosses which lie

between Whitchurch and Ellesmere just to the south east of the main A495 road. They cover an area approximately 5km by 3km although, close by to the south west are the much smaller Cadney and Wem Mosses. The Mosses are considered to have been formed by a similar process as the Meres except that the depressions, initially filled with water, became bog through the accumulation of layers of peat over thousands of years. In the 18th and 19th centuries drainage and subsequent collapse of the bog was caused by the building of the Shropshire branch of the Llangollen Canal in 1807, which runs along the south east edge, the Cambrian Railway in 1863, which cut straight across the north west edge, and the construction of drains to mark the allocation of land for the Bronington and Whixall Enclosures of 1777. The effect was that the well drained outer areas of the Mosses were converted into farmland while where the peat had been exhausted, woodland and scrub took over and some parts were afforested. During the 2nd World War, a large area was taken over by the military for 'Operation Starfish' which involved the installation of a huge number of braziers. These were lit remotely to decoy German bombers into thinking it was a large town or city so that Liverpool and Manchester were spared the worst of the bombing. It was a very successful operation and, to mark that success, on a small area of Whixall Moss, a number of braziers have been set up along with an interpretation

board to tell the story. Still standing, and with its own board, is the 2nd World War command post from where the braziers were remotely lit to decoy the enemy. (Fig 4) The regeneration of the peat continues in spite of the decades of peat extraction which caused huge damage, only ceasing in 1990 when the Mosses were acquired by Natural England and Natural Resources Wales. Since then, more areas of the bog have been bought, woodland has been cleared and ditches



Fig 5, *The Tumps raised bog*

dammed to raise the water level to the peat surfaces. This is ensuring that the peat and the rare environment are being preserved. In the northern portion of the Reserve is the oldest part of the Moss, The Tumps, and this is still 30 feet higher than the surrounding bog having been spared peat digging on the scale of the rest of the bog. (Fig 5)

Access to the Mosses is gained from the villages of Dobson's Bridge and Whixall where small car parks are situated close to the bridges over the Llangollen Canal. A number of trails cross the bog which can be followed, including a section of the Shropshire Way and it is advisable to keep to them. In April 2016 the water level was very high making walking very squelchy in places. However, by taking care and keeping to the clearly marked trails and paths, we came to no harm and the water levels meant that we had good views of birds in the lagoons. (Fig 6) During our visits the weather was windy, cold and at times snowy and the vegetation was still in its winter browns although we also



Fig 4, *World War II Command Post for the remote detonation of Braziers, Fenn Moss*

experienced some very clear times when the



Fig 6, *Flooded Peat cuttings*

fluffy white clouds reflected in the clear peaty waters of the little pools. (Fig 7) Due to the cold we did not see any amphibians and few insects nor the Great Raft Spider which we had hoped would put in an appearance. Perhaps we ought to have delayed our visit until May when the weather was warmer. The Landscape Partnership Scheme has produced a little booklet called 'Fenn's and Whixall



Fig 7, *Lagoon on Whixall moss*

Mosses History Trail' which gives historical information on localities as the walk is followed. The trail leads around the bog and

describes the activities that went on, particularly during the peat extraction period, with emphasis on the traditional methods. In one corner of the bog, near the start of the trail from Dobson's Bridge, a little shelter contains a rotary



Fig 8, *Peat sieve*

sieve and typical peat cutting tools (Fig 8) and alongside is a stack of peat blocks known as 'Whixall Bibles'. (Fig 9) It is evident that the bog has been 'home' to



Fig 9, *'Whixall Bible' peat blocks*

humans for a very long time as the mummified bodies of an Early Bronze Age man, an Iron Age young man and woman and Bronze Age tools were found by peat cutters during the mid 19th century. The trail booklet also describes the history of the bog as indicated by pollen analysis showing that there were periods when the climate affected the vegetation. At this time when we are commemorating the centenary of the 1st World War, it is also fitting to read that the Sphagnum Moss was removed from the bog for use as anti-septic wound

dressings.

The solid geology underlying Whixall Moss is the Triassic Branscombe Mudstone Formation laid down between 200 and 217 mya while, just to the west under Fenn's Moss is the Triassic Wilkesley Halite Member formed in mainly hot dry environments where evaporation of ground water produced evaporites (217 - 229 mya). These Triassic rocks are typical of the Cheshire Basin and are the source of the salt deposits for which Cheshire is noted. As one would expect in a lowland area once extensively glaciated, the surface geology is not well exposed but, as one



Fig 10, *Rounded pebbles in field*

crosses the farmed areas particularly by walking, the glacial till types can be seen on the surface where the fields have been ploughed. The predominant type is sandy with varying numbers and types of well rounded pebbles of sandstones, granite, quartzite, tuffs and rare flints (Fig 10) making the agricultural land away from the Mosses well drained and fertile. Ellesmere town is on a low hill of glacial till (Devensian) but the Norman motte and bailey in the town centre is built on red Wilmslow Sandstone (Triassic 246-251 mya). There are areas where the glacial till is almost all sand, a feature that has been exploited since 1874 a mile or two south east of Ellesmere at Wood Lane. Here the Tudor Griffiths Group, specialising in sand and gravel extraction on a huge scale have an extensive sand quarry and a portion of the worked out quarry has been turned into a nature reserve with attached fishing lagoons. The reserve is carefully managed by Shropshire Wildlife Trust with shallow

lagoons, sand banks and pebble ridges to encourage birds to frequent the reserve. On our visits (which required a permit available from the Shropshire Wildlife Trust visitor centre beside the mere at Ellesmere) we saw a variety of ducks and wading birds, sand martins (using an artificial sand bank for nesting) and many nesting gulls, predominantly Black Headed Gulls but amongst which were three pairs of nesting Mediterranean Gulls. These are vagrants with occasional sightings across this country so their nesting in the Wood Lane reserve indicates that is an excellent site for them. The close proximity of the hides to the birds meant we had good close up views.

The Mosses and Meres are surrounded by the distant mountains of Wales, the hills of Shropshire around Much Wenlock and Craven Arms while, on the east side only a couple of miles from Whixall Moss, a range of hills rises quite sharply on the western edge of Staffordshire. To the south of Whitchurch to the east of the A49 and situated on the edge of these hills are the Hawkstone Park Follies. Set away from the main road, a lane leads up the hillside to a secluded car park set in a gorge-like glade from where a walk takes one up to the visitors' entrance. The Follies are a masterpiece of the 18th century Romantic Garden Movement where the cliffs, precipitous walks, dark tunnels, grottos, woods and glades were exploited to give the 18th and 19th century visitors an exciting and energetic experience. In the 21st century the Follies can still be explored, with views over the Shropshire and Cheshire plain towards the Mosses and Welsh mountains in the distance. The setting reminded me strongly of the massif of Montserrat near Barcelona in Spain. The walks are not for the faint hearted nor the infirm! The paths rise up and down steep steps, narrow steep clefts and damp gorges, over a narrow vertiginous bridge, past stone buildings placed in the rocks overlooking the precipitous drops into the valley. The Grotto, unlit so torches are obligatory (they can be hired from the shop) exploits a 17th century copper mine with stone arches and maze-like tunnels sloping



Fig 11, Gill pointing to Copper ore in the Grotto down to an opening in the rock face over a vertical drop to the fields below. There are veins of the copper ore in the rock shining blue in the dim light from the viewpoint and in the cliff face across the widest gorge can be seen more extensive copper colouration. (Fig 11) It is thought that the copper and barites were emplaced by hydrothermal



Fig 12, *Cross bedding with calcrete and soil horizons*

waters passing through the sandstone as a result of the Tertiary dolerite intrusions at Grinshill, a short distance to the south west. In places there are signs telling the walker that it will take a particular time to return to the entrance, for example, '55 minutes'. Although the entrance can be seen in places from the ramparts of the Follies, the strenuous nature of the terrain usually dictates that it will take longer! At the top in a small grassy glade amongst the tall conifers is a monument erected in 1795 by

Sir Richard Hill to commemorate the first Protestant Lord Mayor of London, Sir Rowland Hill.

Geologically, the rock formation of Hawkstone Park is Wilmslow Sandstone Formation (Triassic 246-251 mya) which extends south east into Staffordshire while to the north and west, the bedrock is composed of the Bollin Mudstone Formation (formerly called the Mercian Mudstone). The sandstone was formed in a hot dry environment where evaporation was greater than rainfall and dunes, loess and evaporites were normal (OpenGeoscience website). In the tall faces of the red cliffs, excellent aeolian cross-bedding is visible with calcrete formations on the tops of the beds indicating that there were periods when these were on the surface. (Fig 12) It is this change of lithology, mudstone to sandstone that has produced the

upstanding rock formation of the Park. Although the sandstone has resisted the erosion by the ice age, it is not particularly hard with the rock of the Follies varying from hard compact sandstone to loose unconsolidated sand. The hardest sandstone is mostly red with greenish to yellow patches but the loose sand, mainly in clefts and under overhanging ledges, is pale grey to cream where weathering has leached out the iron. (Fig 13) The meltwater from the ice is thought to be the cause of the gully and ravine formation, and

as the sandstone is faulted, producing a double escarpment which repeats the succession, the erosion by the meltwater scouring out the ravines and gullies along the fault lines. (I was not able to discern any obvious faults nor does the OpenGeoscience geological map record any in the Park). We had a chuckle early in the walk around the Follies when we came on a board telling us that "the rock face to your left is possibly over 50 million years old and the red colour comes from the weathering of iron oxides in the sandstone". I could not resist telling the staff in the visitors' shop that the age

.Anglesey Field Trip May 2016

Isabel Buckingham

Have you seen the books that claim to train your mind? Ignore them and attempt to understand the geology of the island of Anglesey. The contrasting and contradictory theories will stretch your mind into realms your imagination will struggle to match.

Uniquely the original map and memoir for Anglesey was the self-funded work of one man Greenly, who spent thirty years, assisted by his wife, mapping the island and writing the Memoir which he presented in its entirety to the Geological Survey who published this in 1919. It has very recently been remapped, with much reinterpretation, which is online only. Greenly's mapping is impressive but he was working without any modern methods many of his interpretations have been challenged. This whole island is now a Geopark. Explanation boards are



Fig 13, *Pale crumbly sandstone at the Retreat*

estimate on the board was about 200 million years out!

We had heard and seen about the unique Mosses and Meres of Shropshire on the BBC Countryfile programme which made us determined to visit this unique environment. Although we were too early in the year to see the bogs at their best, the cold weather with snow showers showed how bleak the bog can be. It was, nevertheless a worthwhile visit as we saw many nesting birds and heard cuckoos on many occasions as they looked for suitable bird hosts for their eggs. Perhaps we should return at warmer time of year! Hawkstone Park Follies was a real surprise, in more ways than one, as we did not expect the walk to be such hard, tiring exercise or take as long as it did to walk around. It was, nevertheless, a most interesting and unusual place.

Shropshire County Guide 'Shropshire's Meres and Mosses' by J.A. Bayley (date not known).

'Shropshire Meres and Mosses' 1993 N.Jones. Published by Shropshire Books (out of print)

Further information on the geology of Hawkstone Park can be read in a Field Trip



Fig 1, *Basal Carboniferous conglomerate*

found. Some are really very up to date and others use discredited explanations. So accept nothing without careful thought. In time dates started to emerge and stratigraphical tables were reshuffled. The twin problems are that good exposures are almost all coastal, the interior being covered by glacial deposits, and most junctions are faulted. There is agreement that the area had settled down by the Carboniferous, the Llyn Peninsula should also be considered and that it is very different to Snowdonia.