Amongst the rarest fossils are the remains of true terrestrial dinosaurs that were washed out to sea, and those of pterosaurs, flying reptiles that may have died over the sea or been carried out to sea trapped in floating debris.

The Lower Oxford Clay is a brick clay famed for its bituminous quality; its high organic content means bricks are 'self-firing'. Heated to a high temperature, the clay will burn from within, reducing the amount of fuel needed. Brick clays were extracted across the Marston Vale, a low swathe of clayland south of Bedford, from pits such as those at Stewartby, and formed the basis of a huge brick industry, now ended. The 'tight' Oxford Clay is so impermeable that the pits were later used as repositories for land-fill, also ended. Now the Marston Vale is a designated Community Forest centred around the old brick pit of Stewartby Lake in the Millennium Park.


Marston Vale Forest Centre

The Greensand Ridge

The higher ground that rises to the south of Marston Vale is in fact the record of another inundation by the sea in the later Cretaceous period and marks the boundary of our Jurassic Park.

The Ice Age

Much of our area contains evidence of the advance and retreat of a great ice sheet during the Pleistocene Ice Age. Much of this area was a very inhospitable place for most of the last two million years; almost half a million years ago it lay beneath the Anglian ice sheet. This left thick till (glacial clay once called 'boulder clay') lying on top of the Oxford Clay and the oolitic limestones. As the ice retreated North Bedfordshire was a frozen tundra landscape with swollen seasonal meltwater rivers cutting down into their valleys. Hence the modern Great Ouse was born. Large amounts of river gravel, now extracted from the many gravel pits along the river, were deposited as terraces on the valley sides. Many of these flooded pits are now valuable wetland habitats such as Felmersham Nature Reserve.

Towards the end of the last glacial period there would have been mammoths walking here along with bison, reindeer and other animals you would not associate with Bedfordshire today. From 10,000 years ago people joined the herds of migrating animals. Mammoth teeth and tusks and other mammal bones, and Palaeolithic stone tools, have been found together in the river gravels.


Mammoth Tooth

Front cover: Chellington Church with Harrold-Odell CP

BEDFORDSHIRE GEOLOGY GROUP

The Bedfordshire Geology Group was formed in 2004 by a group of enthusiastic amateur and professional geologists. We aim to encourage an understanding of the rocks and landforms of the county for the benefit of all. One of the main ways of doing this is by identifying and popularising Local Geological Sites which are of scientific and educational importance.

Members enjoy field trips, clearing overgrown sites, lectures, workshops and social events – all aimed at getting familiar with local rocks and fossils. We also arrange guided walks in order to share our interest in the varied scenery of Bedfordshire

We work closely with local companies, museums and county parks. Recently we have collaborated with The Wildlife Trust, The Greensand Trust, Natural England and English Heritage on different projects around the county.

Educational support for schools is arranged by request. This often involves classroom-based sessions that introduce pupils to exciting geological topics such as dinosaurs and volcanoes. Alternatively we can organise outdoor visits to help students learn more about their natural environment.


Harrold Bridge

For more information, contact us through our website
or by email to
secretary@bedfordshiregeologygroup.org.uk

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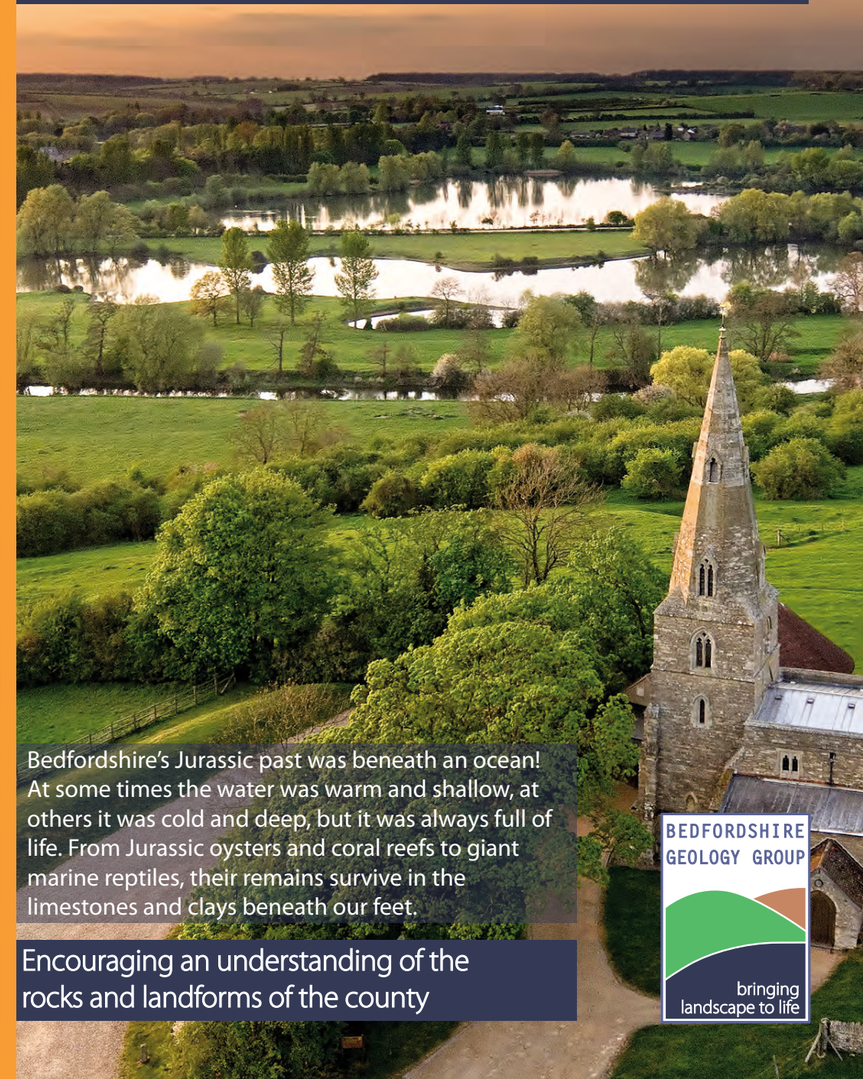
This leaflet has been funded with help from The Wixamtree Trust

www.bedfordshiregeologygroup.org.uk

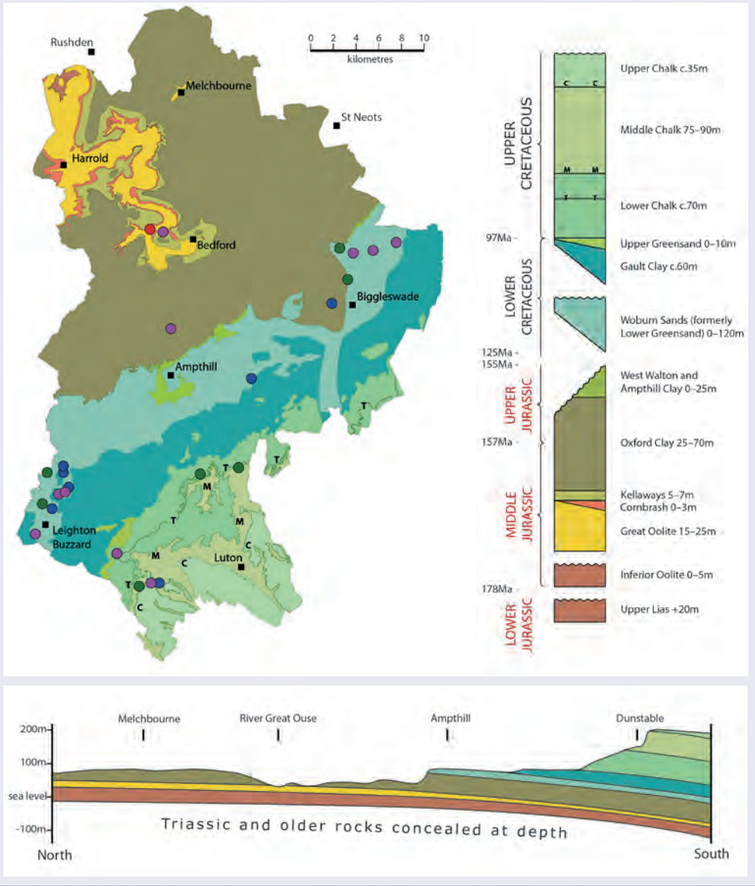
BEDFORDSHIRE'S JURASSIC PAST



Bedfordshire's Jurassic past was beneath an ocean! At some times the water was warm and shallow, at others it was cold and deep, but it was always full of life. From Jurassic oysters and coral reefs to giant marine reptiles, their remains survive in the limestones and clays beneath our feet.

Encouraging an understanding of the rocks and landforms of the county

BEDFORDSHIRE GEOLOGY GROUP
bringing landscape to life



Bedfordshire's Solid Geology

The key shows the approximate age in millions of years (Ma) and the range of thickness in metres (m) of the bedrock units. Rocks do not occur continuously and often get worn away, so there are time gaps indicated by the uncoloured parts of the key. The section shows how the rocks dip towards the south-east, at angles of only 2–3 degrees.

Bedfordshire's Jurassic Past

The rocks of Bedfordshire date from the early Jurassic period, about 190 Ma. For various reasons, including the deformation of the Earth's crust caused by Africa colliding with Europe, England tilts slightly down to the south-east and erosion has exposed the older rocks in the north-west of our county, these becoming younger towards London. The ice sheets of the Ice Age left their deposits on top of the solid rocks and these glacial deposits are still preserved at the surface over large areas.

Jurassic Bedfordshire – welcome to the Bahamas!

In the Middle and Upper Jurassic, Britain, and hence Bedfordshire was located much closer to the equator, with a warmer climate than today, and covered with a warm shallow tropical sea, in an environment just like that of the Bahamas today. All Bedfordshire's Jurassic rocks are marine, so this was an underwater 'park' full of ammonites and other molluscs, fish and marine reptiles instead of dinosaurs and other land animals.

The Jurassic Limestones

The oldest rocks, known as the Inferior Oolite, are fairly muddy, telling us that land was not too far away when it was laid down; it is a poor building stone and so is rarely quarried. However the next rock in the sequence, the Great Oolite, has much less mud, is well-cemented and makes a good building stone. These limestones are oolitic; they contain small rounded ooliths, tiny spheres of calcium carbonate formed in the shallow clear tropical sea as currents rolled them around, collecting concentric layers of lime around a tiny nucleus of sand or broken shell. Ammonites, bivalves, brachiopods and sea urchins are common fossils in this rock. The Great Oolite is found at the surface in a thin strip of land on the valley sides of the Great Ouse upstream of Bedford. It is the use of this rock as a local building stone that gives pretty villages such as Harrold, Odell, Pavenham and Stevington their character.


Oolitic Limestone

The last of the limestones is the Cornbrash. This thin rubbly limestone is different because it contains very many broken shells giving it a rough and gritty texture. It occasionally provided roof tiles in Roman times but is not used today. However it does make a fertile well-drained soil – Corn Brash – a place where good corn is grown.


Cornbrash Limestone

Today there are no working quarries or partially-exposed old pits; the only place to see the limestone is in the Ouse Valley buildings and bridges made of the local stone. First mentioned in 1224, Bromham Bridge (TL011507) is largely built of Great Oolite limestone. Much of it is fossiliferous, notably bivalve shells, and shows cross-bedding lines in the stone marking the slip-faces of small underwater dunes; they always slope down in the direction of flow of the current. When looking at buildings in the Ouse valley you can see similar fossil features, and also the chiselled toolmarks made when the stone was cut by hand.


Bromham Bridge

The Jurassic Oxford Clay

As time passed the sea deepened and land lay further away. 150 million years ago only small light particles were carried so far out to sea and these eventually settled as clay on top of the limestones. The thick grey Oxford Clay covering much of north and mid Bedfordshire is full of organic matter derived from the rich planktonic marine life and the fossilised remains of the animals that thrived here. The shells of the Jurassic oyster Gryphaea, (sometimes known as 'the devil's toenail') and belemnites ('the devil's thunderbolt') are perhaps the most common of all, but there are also many ammonites.


Devil's Toenail (Gryphaea)


Belemnite


Ammonite

There were also large marine reptiles in the sea, ichthyosaurs, plesiosaurs and pliosaurs which preyed on the smaller animals – and on each other.