

PRESENT

QUATERNARY  
2.6 million years

TERTIARY

65 million years

CRETACEOUS

146 million years

JURASSIC

208 million years

TRIASSIC

245 million years

PERMIAN

290 million years

CARBON-IFEROUS

362 million years

DEVONIAN

408 million years

SILURIAN

439 million years

ORDOVICIAN

510 million years

CAMBRIAN

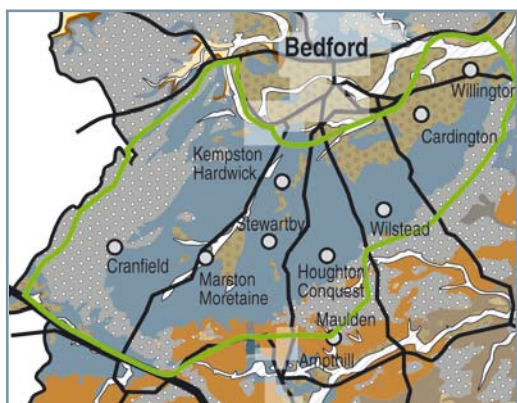
570 million years

PRE-CAMBRIAN

4.6 billion years

## Bedfordshire's Jurassic Park

The Marston Vale is a low swathe of clayland south of Bedford, sandwiched between the Greensand Ridge to the southeast and the higher ground above the limestones to the northwest. The vast differences in drainage and soil type – and therefore wildlife, agriculture and industry – between these areas is entirely a function of their geology, which is determined by the environments that existed here thousands or even millions of years ago. Some of these are partly concealed on the map below (for example, a thick carpet of glacial till covers most of the creamy limestones of the Ouse Valley in this area) but their resistance to erosion still determines the shape of our landscape.



	<b>Boundary of the Marston Vale</b>	
	<b>Alluvium</b>	<i>relatively recent sediments</i>
	<b>Till</b>	
	<b>Glacial Sand and gravel</b>	Quaternary <i>Today–2.6 million years ago</i>
	<b>Terrace gravels</b>	
	<b>Gault Clay</b>	Cretaceous
	<b>Lower Greensand</b>	65–146 million years ago
	<b>Ampthill Clay</b>	
	<b>Oxford Clay</b>	Jurassic 146–208 million years ago
	<b>Cornbrash Limestone</b>	
	<b>Great Oolite Limestone</b>	

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## The Bedfordshire & Luton Geology Group

We exist to encourage understanding of the geology and geomorphology of the county and to undertake site recording, interpretation, advice and education. We aim to:

- Protect local geological and geomorphological sites
- Encourage public enjoyment of rocks, fossils and landscape
- Encourage the use of RIGS\* sites by the public, by schools and local groups
- Keep a listing of RIGS sites in Bedfordshire
- Provide information for potential users of sites
- Encourage landowners to participate in the scheme
- Involve landowners and users of RIGS in good practice and management

### What are RIGS?

Regionally Important Geological and Geomorphological Sites, places that reveal our geological past and are considered important enough to deserve conservation. They include sites where rocks can be seen (such as quarries and road cuttings) or where the geology or geological processes can be inferred from the shape of the landscape. Even buildings made of local stone can be RIGS! Official RIGS are recognised by county councils and by Natural England (the statutory nature conservation body of England).

### How to contact us

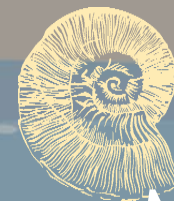
For more information about the BLGG and our events as well as the geology and geomorphology of your area visit our website at

[www.bedsrigs.org.uk](http://www.bedsrigs.org.uk)

or contact Chris Andrew c/o Bedford Museum, Castle Lane, Bedford, Bedfordshire MK40 3XD. Tel: 01234 353323; Fax: 01234 273401



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# Jurassic Clays: Marston Vale

Bedfordshire & Luton Geology Group



bringing landscape to life



The view north from the Greensand Ridge over Marston Vale, including water-filled brickpits and the kilns at Stewartby.

Bedfordshire's Jurassic Park was an ocean!

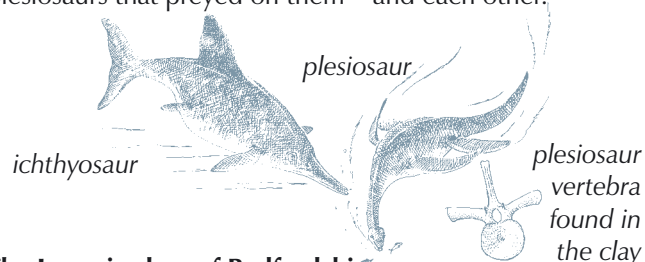
At some times the water was warm and shallow, at others it was cold and deep, but it was always full of life. From Jurassic oysters and coral reefs to giant marine reptiles, their remains survive in the limestone and clays beneath our feet.



## Jurassic Bedfordshire: the open sea

During the Bathonian Stage of the Jurassic Period (170 million years ago) Bedfordshire was covered with a shallow, warm, tropical sea, an environment just like the modern Bahamas. The limestones deposited at that time are discussed in the 'Jurassic Limestone' leaflet available from [www.bedsrigs.org.uk](http://www.bedsrigs.org.uk) The youngest of these is the **Cornbrash** shown on the diagram below.

As time passed the water deepened and dry land lay further away. 150 million years ago only small, light particles were carried far enough to fall on the limestone seafloor to become our Jurassic clays. The sea was still full of life, including ammonites, oysters and other bivalves, many fish, and the ichthyosaurs and plesiosaurs that preyed on them – and each other.



### The Jurassic clays of Bedfordshire.

Not all are visible in surface exposures; some are seen only in the cores from boreholes.



## Marston Vale through the ages

### 150 million years ago: the Oxford Clay

If you live in the Marston Vale, Bedford or most of the north of the county, you're living on a Jurassic park. The thick, grey Oxford Clay is full of organic matter and the fossilised remains of the animals that lived here 150 million years ago. The shells of the Jurassic oyster *Gryphaea*, also known as the 'devil's toenail' are perhaps the most common of all. Among the rarest fossils are the remains of true terrestrial dinosaurs that were washed out to sea (an ankylosaur was found last year), and those of pterosaurs, flying reptiles that may have died over the sea or been carried out to sea trapped in floating debris.



*Gryphaea*, upper (flat) and lower (curved) shells

Kosmoceras, an ammonite of the Oxford Clay



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 itself will burn. Brick clays were extracted at pits including those at Stewartby (formerly called Wootton Pillinge when the works were opened in 1897). Stewartby Lake in the Marston Vale Millenium Park is an old brickpit. The clays can be seen first-hand today in working pits such as Quest Pit (recognised as a RIGS), but visits must be organised with specialist groups.



**Quest Pit, Stewartby.** The working face is in the distance; the foreground has been restored to create wildlife habitats.

### Up to 65 million years ago: the Cretaceous period

Above the Oxford Clay there is a long gap in our history of the Marston Vale. The sea receded and erosion of what became dry land removed much of the evidence. The Greensand Ridge that now rises south of the vale is in fact the record of another inundation by the sea that began 115 million years ago, deepened, then retreated again until, 65 million years ago, Marston Vale was above the sea once more. (Several leaflets giving more information about the Greensand are available from the BedsRIGS website.) Records of the next part of our geological history, all the warm Tertiary period, were again lost to erosion – we know nothing more of what happened here until the Ice Age.

### 2.6 million to 10,000 years ago: the Ice Age

The Marston Vale was a very inhospitable place for much of the last 2 million years. At least 3 times this was a frozen landscape known as *tundra*, and on one occasion (almost half a million years ago) it lay underneath a thick ice sheet. The evidence for this is in the thick *tills* (glacial sediments) lying on top of the Oxford Clay (and the limestone rocks) in and around the Marston Vale. The ice sculpted the landscape, leaving harder rocks such as the Greensand standing high above the softer clays. It was during this time that, swollen by water flowing from the melting ice, all our major rivers cut down into their valleys. The Great Ouse was born. (You can find out more about Ice Age rivers in our leaflet *The River Ouzel: its wild past.*)

Toward the end of the last glaciation there would have been mammoths walking the vale, along with bison, reindeer and other animals you would not associate with this part of Bedfordshire today! From 10,000 years ago people joined the herds of migrating animals; we've stayed and begun to alter the landscape ourselves.



Mammoth teeth and stone tools dating from the end of the Ice Age are found in Bedfordshire river gravels.