

As most of the items on the 'Geology & Geography' pages were originally published in the *Woking Advertiser*, you may appreciate that there was a limited amount of space available. That is obviously not the case here, so on this page (and in later sections) I intend to expand on the notes supplied to the newspaper, to give a more complete 'history' than is possible in print.

Obviously the newspaper articles are aimed at the 'general public' whose interest in Woking's History can range from someone who has a few minutes to spare whilst reading the paper on their morning commute, through to real enthusiasts, some of whom probably know more about Woking's past than I do. I am assuming, as you have got this far, that you are probably one of the latter and you therefore have a little more than a passing knowledge of the subjects covered in these extra pages. I hope, therefore, that I do not bore you too much by covering points that you already know.

GEOLOGY

Iain Wakeford © 2014, revised with added notes 2020

The geology of the Woking area is not often written about. Local historians tend to ignore it, noting simply that most of the area lies on the Bagshot Sands with alluvial in the river valleys and (if they are being really thorough) terraces of river gravel beside the Wey and Bourne. Even the great Alan Crosby in his *A History of Woking* (Philimore 1983), didn't go into much detail on the various soils of our area, preferring to concentrate on the topography of Woking in the entire one and a half pages he devoted to the 'geographical background' of the area!

The main exception appears to be the often forgotten (and sometimes derided) Arthur Locke whose series of local newspaper articles, published before the Second World War, were subsequently gathered together and produced as *Woking Past*. He made the following observation.

'The most recently deposited soil in the district is the alluvium brought down by the Wey and the Hoe Bourne, which forms two wide tongues of meadow land that unite below Woking Park. The streams themselves do not unite until they pass beyond Newark. From Sutton to near Woking Village an old marine stratum, the London clay, is exposed where it is not covered over by Wey alluvium. Upon that clay lie the Bagshot Sands in three layers, lower, middle and upper. These sands accumulated at or near the estuary of a great river, of the out-fall of a chain of semi-marine lagoons, which ran from west to east in a geological epoch earlier than that in which the two Bournes first trickled down from those same Bagshot sands.'

He goes on to state 'Their estuarine character is well attested by finds of various fossils which cannot be mentioned here', although later on (whilst talking about the building of the railway) he does mention the sharks teeth found in the Goldsworth Cutting (see initial article and right).

Most Surrey Historians include some detail of the geography and geology of the county, but tend to concentrate on the more 'impressive' geological features such as the Downs and the Weald - the Bagshot Sands often get just a fleeting mention. And Regional (let alone National) geographers, who you would hope to rely on for detail of the formation of the 'rocks' beneath of feet, likewise seem to be more entranced by the Chalk ridge, the Greensands and the Wealden Clays.

Archaeologists, of course, must have an interest in the geology of the region, and Roger Hunt (with David Graham, Giles Pattison & Rob Poulton) in the book *Hidden Depths - An Archaeological Exploration of Surrey's*

Past' (published by the Surrey Archaeological Society in 2002) does a good job of briefly explaining how Surrey's landscape evolved. Hunt explains that the Wealden Clay was 'laid down around 130 million years ago when the area was very different' and notes that 'where London is today, steep sided mountains existed

from which rivers flowed south to a sea that extended to what is now continental Europe', but when it comes to the Bagshot Sands he seems to have run out of interest and simply noted 'to the north-west of the county the Bagshot, Bracklesham and Barton Beds form very poor sandy and loamy acid soil'.

SOME NOTES ON THE OLD FOSSILS OF GOLDSWORTH

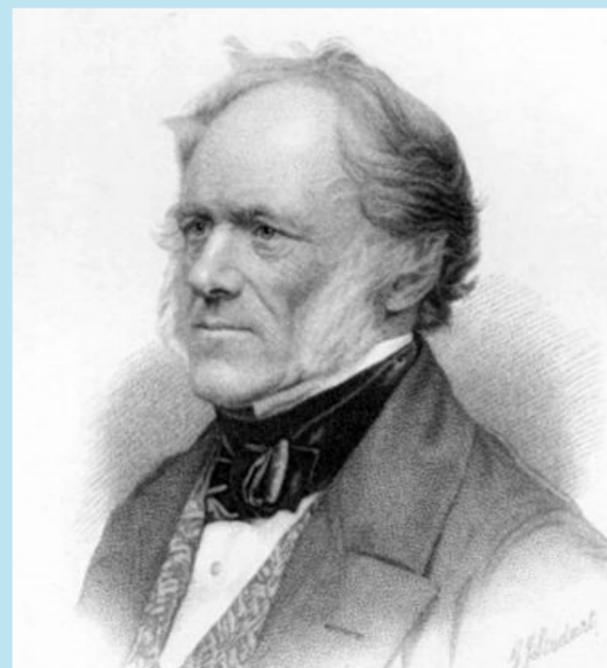
In 1839, James Wyld in his 'The London & Southampton Railway Guide' wrote that 'a long deep cutting is entered at Goldsworthy Hill, where some important geological discoveries have been made, confirming Mr Lyell's opinion of the marine formation of the Bagshot sand. These consist of portions of the emys, and teeth and other remains of sharks, rays, saw-fish, and three new varieties of fish.'

The fossils were evidently examined by the Rev. Dr. William Buckland (who in 1823 had discovered the 'Red Lady of Paviland') as in 1847 Joseph Prestwich (the expert in Victorian times on the Tertiary Deposits of the London Basin), wrote in the *Quarterly Journal of the Geological Society*¹ the following...

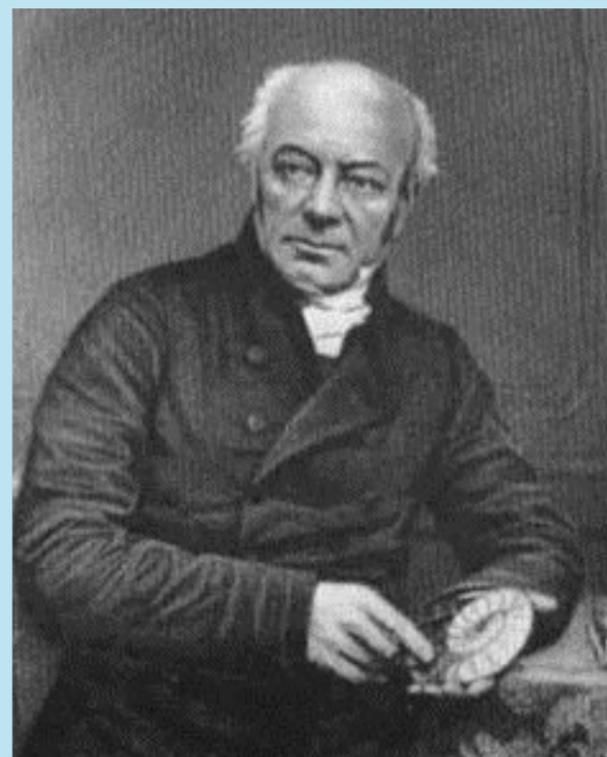
'Without any permanent natural sections, and with few artificial ones beyond an occasional sand or clay pit - the almost only opportunities for studying the structure of the Bagshot sands are afforded by fresh roadside sections and railway cuttings.

The fossils are as rare as the sections. The three genera (for the species were not distinguishable) of testacea found by Mr Warburton at Chobham; and the subsequent notice by Dr Buckland in 1838 of the remains of fishes (including the determination of three new genera) at Goldsworthy, near Woking, comprise I believe all at present known of the palaeontology of the Bagshot sands.'

Mr Lyell was undoubtedly Sir Charles Lyell the famous geologist and friend of Charles Darwin, whilst Mr Warburton is, I believe, the person who first came up with the name 'Bagshot Sands' in his paper for the Geological Society in 1822²



Sir Charles Lyell (above), with the Rev. Dr. William Buckland (below) - two eminent Victorian Geologists with an interest in the Bagshot Sands.



Quarterly Journal of the Geological Society, Volume 3, p378-409.

2. Warburton, H. 1822 'On the Bashot Sands', *Transactions of the Geological Society*, Series 2, Volume 1, p48-52.

1. Preswich, J. 1847 'On the main points of structure and the probable age of the Bagshot Sands and on their presumed equivalents in Hampshire & France'.

In 1975 the University of Surrey published a book on 'The Surrey Countryside', chapter one of which by J.E. Atkins and J Sallnow, covered the 'Geology, Geomorphology and Climate of Surrey'. For me this was one of the first books I read that made any sense of the complex geology of the county (see next article) but yet again virtually all they have to say about the Bagshot Sands is that 'these beds occupy the north-western part of Surrey and consist of fine buff-coloured sands with some flint pebbles'!

Regional Guides are not much better. In the Natural Environment Research Council, Institute of Geological Sciences' *British Regional Geology of London & Thames Valley* (by R.L. Sherlock, 1935, HMSO), they have a whole chapter on the Eocene strata of the region, but unfortunately only have the following to say about the Bagshot Beds...

'These strata are mainly fine white, buff, and sometimes crimson sands, with occasional seams of pale pipe-clay and local beds of flint-pebble gravel. They form much of the elevated ground in the middle of the London Basin, including the high grounds of Harrow, Hampstead, Chertsey, and Esher; also, in Essex, Havering-atte-Bower, Brentwood and Kelvedon Hatch. The full thickness probably does not exceed 120ft. Fossils are confined to pieces of lignite and plant fragments and a few casts of marine gastropods'.

They then move onto about half a page about the associated Bracklesham and Barton Beds,

but go into no details of how they were formed — possibly reflecting the opening line of the Eocene chapter where it states 'according to some geologists the Eocene strata are not of sufficient importance to be classified as a System'.

The Bagshot Sands might not be of importance to some geologists, but to us in Woking (if not Harrow, Hampstead and parts of Essex) they are very important indeed.

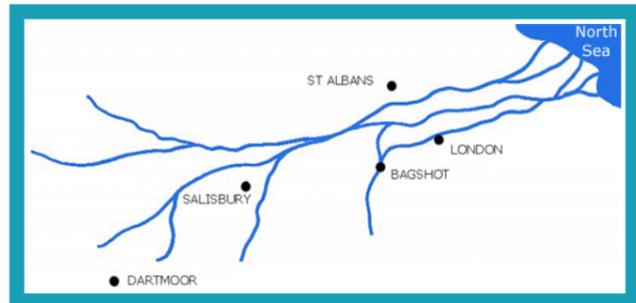
Having purchased all the above publications I thought that perhaps a more 'local' geological publication might be more helpful, so I bought 'The Geology of the Country around Aldershot and Guildford' by H.G. Dines and E. H. Edmunds (HMSO, 1929 — part of the

Memoirs of the Geological Survey of England & Wales, Vol 285). It goes into much greater detail of where various outcrops occurred, which together with the *Victoria County History of Surrey* (edited by H.E. Malden, published in four volumes from 1904 to 1911 by Archibald Constable & Co Ltd, including in the first volume a chapter by G.W. Lamplugh on the Geology of the county), helped answer my questions on how, when and why the Bagshot Sands were formed (and probably where Arthur Locke got his well-informed information).

Lamplugh explained that 'After the long period of depression indicated by the London Clay, the pendulum of change once more swung slowly back, and a gradual re-elevation set in which brought shallow water conditions again into our area. This change is indicated by the character

of the beds by which the London Clay is overspread, which consist of a thick mass of sand and pebbly beds, with a subordinate clayey portion, known collectively as the Bagshot Beds. Fossils are extremely rare throughout this series in Surrey, but the few that have been found indicate that the deposits are of marine origin.'

'The equivalent beds in the Hampshire Basin are, however, in their lower portion, partly fluvial and estuarine, so that we seem - to have evidence of the existence of a river flowing from west to east during the accumulation of the series'.

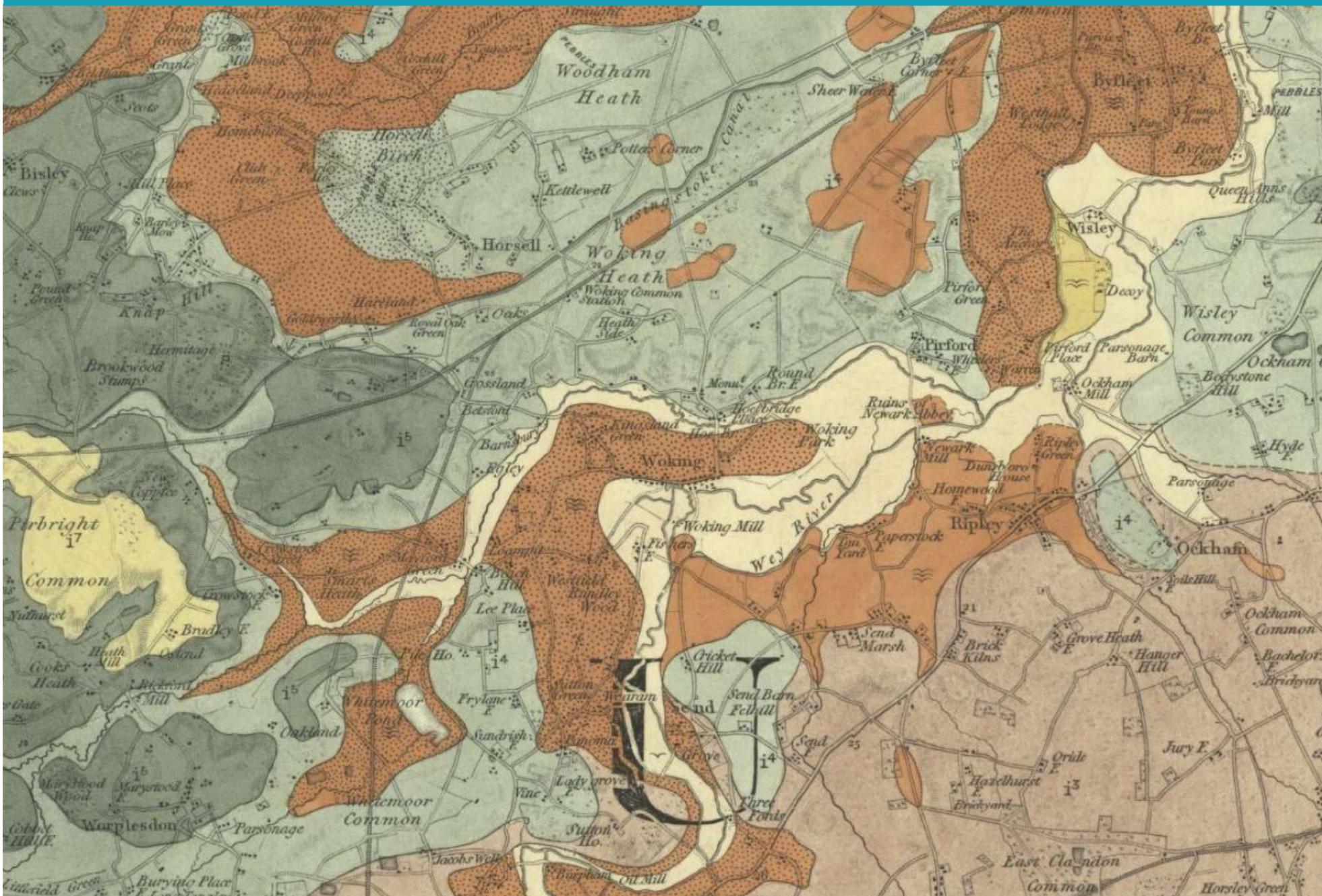


This 'Great Bagshot River' as it is sometimes known, is thought to have flowed from what is now the Dartmoor area across Salisbury Plain to drain into what is now the North Sea beyond London and Essex.

Dines & Edmunds add, 'following the deep-water conditions of the London Clay, a shallowing occurred and the sediments consequently became of coarser grain and a fauna indicating shallower water reappeared'.

'At irregular intervals there are thin seams of pipeclay which are locally broken and disturbed by current action, the pieces having been worn

1887 (updated from 1862) Ordnance Survey 1" (Old Series), Drift Map, surveyed by W Whitaker, F.J.Bennett & CE. Hawkins. The Bagshot Sands are grey/green, with the Bracklesham Beds a darker grey and the Barton Beds around Pirbright a slightly darker yellow than the Alluvium of the Wey and Boume Valleys, contrasting with the brown river gravels and London Clay





The brickworks on Anchor Hill where the Woking Field Club collected fossils in 1898.

into pellets and distributed through the sand above the clay seam’.

They note that ‘from the western edge of the district to Whitmoor Common the width of the outcrop does not exceed a mile, but eastward of this point the overlying Eocene beds have been eroded and apart from outliers of Bracklesham Beds at Hook Heath and Redhill, near Ockham, and a covering of drift, the Bagshot Beds occupy an area of about 35 sq. miles’.

‘The thickness of the beds is not uniform, but generally decreases southward and westward. Wells prove that at Wellington College, which lies to the north of the district, the beds are 130 ft. thick, at Brookwood, 110 ft. and at Aldershot, 80 ft.; it is possible, however, that at the first two localities some Claygate Beds are included in the thicknesses given’.

Talking of the fossils that were found, especially in the Bracklesham Sands, they note ‘fossil molluscs, fish teeth, bones of turtles, and lignite occur locally. The shells are of marine species and indicate shallow-water conditions and a warm climate. The beds present the characteristics of deposition along the shore-line, in shallow to moderately deep water. The glauconite was deposited at depths below which the effects of wave action are not felt; the pebble-beds, which usually show current-bedding, resemble shingle-banks; while lagoon conditions are indicated by the deposition of thin seams of precipitated calcite’.

It was in these beds that the members of the Woking Field Club were looking in 1898 (mentioned in the Woking Advertiser article).

Finally, above the middle Bagshot Beds, represented by the Bracklesham Sands, the upper part of the Bagshot Sands, is thought to correspond to the Bargate Sands of Hampshire, which according to Dines and Edwards ‘differ from those of the Bagshot Beds in the absence of current-bedding and in texture’.

‘The fine sands of the Barton Beds point to deeper water conditions than those that prevailed during the deposition of the Bagshot

Beds’ the fauna of which ‘indicates deposition in a sea of considerable depth’.

Plateau gravels, further west, resemble flints affected by beach action, probably from pebbles of Greensand Chert, with Ironstone from the Folkestone Beds also possibly washed down by the Great Bagshot River noted above, and it is probably this river that also brought us the Sarsen Stones that can still be found in places around Woking, including the large ‘monolith’ discovered whilst digging a pipeline across Horsell Birch and now erected on the grass near the Cricketers public house.

Having said that, it appears that the origins of later deposits that may or may not have lain above the Bagshot Sands were much debated at that time, and I have not found anyone who can tell me which of the various theories expressed by the Victorian and Edwardian Geologist are now generally accepted—unless there are some keen local geologists out there willing and able to enlighten me!

Note.

The ‘Bagshot’, ‘Bracklesham’ and ‘Barton’ Beds now seem to have been re-classified (at least in this area) as the ‘Bagshot’ ‘Windlesham’ and ‘Camberley Sand’ Formations on modern geological maps.



Left: A small Sarsen ‘monolith’ beside the sandy track across Horsell Common (from Anthony's, passed the Sandpits towards Shores Road). The stone has been erected near the Danewell Gutter stream, but does not appear to have been an ancient standing stone.

Below: one of a number of large sarsen stones to be found in the back gardens of houses in the Hook Heath area.

