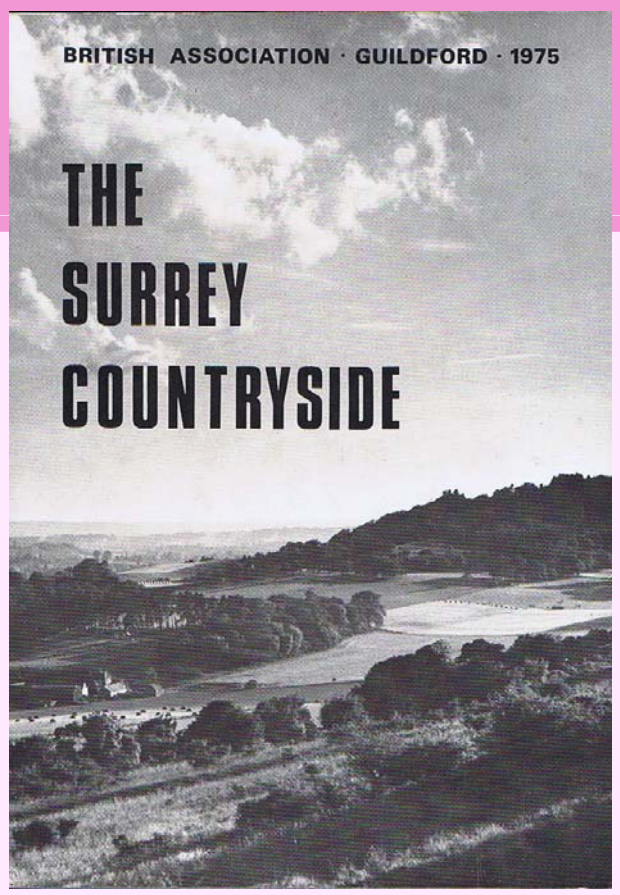
The Geology of Surrey with notes and quotes from 'The Surrey Countryside' — 'Geology, Geomorphology and Climate of Surrey' by J.E. Atkins and J Sallmow (Surrey University, 1975)



When it comes to explaining about the deposition of the sedimentary rocks that make up Surrey, I can do no better than to quote what Atkins and Sallnow had to say on the subject in their chapter on the Geology, Geomorphology and Climate of Surrey in 'The Surrey Countryside' (University of Surrey, 1975). I hope I do them no injustice by extracting a few quotes from their work, which I trust will nicely illustrate exactly how, why and when the rocks of our region were formed.

'The oldest of those [rocks] that are exposed today are those that date from the invasion of the area by the sea from the south during the early Jurassic period, about 175 million years ago. The Jurassic marine sediments, which were deposited over a period of 40 million years, covered the area of the Weald, which is a large part of south-eastern England. Towards the end of the Jurassic period this marine basin became a saline lagoon and later, in the early part of the Cretaceous period, it became a brackish or freshwater lake into which flowed a series of large rivers. That river system covered a large part of present-day Britain! The rivers discharged a large amount of material into an area known as the Wealden delta, forming the Hastings Beds, which constitute the High Weald of East Sussex and south-west Kent. As the environment of the delta changed to that of a brackish water lake, the succeeding stratum of Weald Clay was deposited.'

Later on they go into more detail on this lake 'whose northern shore ran approximately from Croydon to Canterbury'. To the north was a lowland area formed of Jurassic sediments with uplands of older rocks further north. 'Material derived from these older uplands was carried down by two large rivers, which formed a composite delta extending into the Wealden Lake, and was deposited in an elongated, subsiding basin, the Anglo-Paris Basin, which ran southwards and was connected to the sea in central France.'

They then go on to explain how the other layers of rock were formed on top...

'At the end of the period corresponding to the deposition of the Weald Clay the salinity of the Wealden Lake increased as its link with the sea became stronger. The lake, in fact, became a shallow, marine bay in which the Lower Greensand was deposited'.

There then followed a major marine transgression (invasion of a large area of land by the sea in a relatively short geological period) during which the Gault Clay was deposited.

'Over the whole of southern England the base of the Gault is marked by an important marine transgression, which swept northwards and westwards and pushed back the shoreline of the Lower Greensand sea to the borders of Wales and into northern England'.

'The Gault was laid down in quiet water away from the source of sediment, while the Upper Greensand was probably deposited in shallow, current-swept conditions near the shorelines'.

And then as the whole region gradually submerged, came what appears to be every local geologist's favourite - the chalk.

'Chalk is a soft, white, friable limestone consisting of over 95% calcium carbonate. It was deposited as a limy ooze on the bottom of the sea, probably no faster than 0.3 m (1 foot) in 30,000 years. This chalk-forming ooze is largely composed of the microscopic skeletal fragments known as coccoliths which were probably derived from algae (simple aquatic plants). From time to time, southern Britain was raised as the result of earth movements and the Chalk Sea became very shallow. The Chalk laid down at such times contains fossils of shallow-water creatures such as sponges and coral. Coccoliths are present in vast numbers and in all stages of disintegration down to individual component crystals. The proportion of coarse to fine material varies considerably within certain limits, giving rise to chalks of different lithological character'.

'The bulk of the Chalk, however, was probably laid down in a relatively shallow sea, about 180 in fathoms) deep, that is below the level of wave action'.

'Towards the end of the Cretaceous period earth movements caused a major regression of the Chalk sea over much of north-west Europe, thus ending the Mesozoic era and commencing the Tertiary, or third geological era. These earth movements initiated the lifting of the Weald and converted it into a land area, probably of low relief and surrounded by a shallow sea.'

'In the earlier part of the Tertiary era, known as the Eocene period, the sea alternately encroached upon and retreated from the new land area which was being intermittently raised as the [Alpine] orogeny gathered force. Evidence of these uplifts lies in the presence of Lower Greensand chert pebbles, probably derived from the Weald, which occur in ten Tertiary deposits from late Eocene times onward, indicating that subaerial erosion of the Weald had cut down as far as the Lower Greensand. These movements were the outer fringes of those which were producing the Alps and Himalayas. The culmination occurred during Miocene times (about 25 million years before present) when the Weald was folded into a broad anticlinal structure, but with minor anticlines and synclines'.

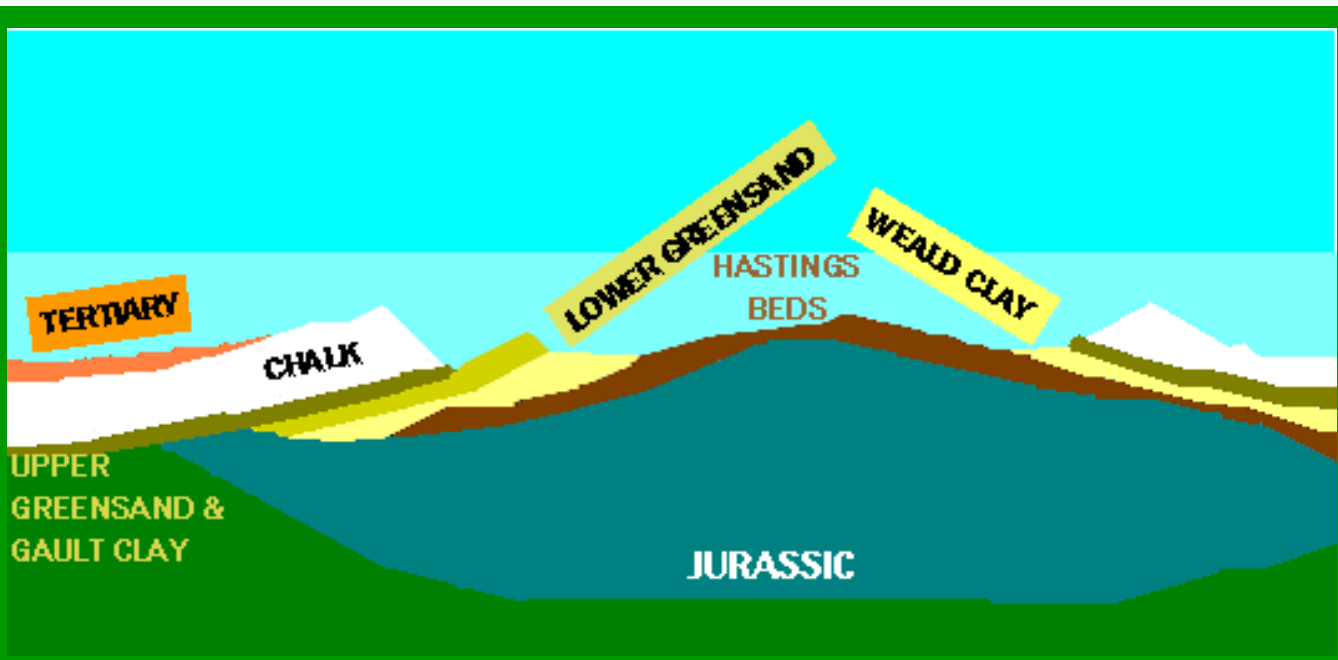
'The Eocene beds of north-west Europe were originally deposited in one large sedimentary basin, the Anglo-Franco-Belgian Basin'.

Here there are two smaller basins separated by the western extension of the Wealden uplift—the Hampshire and London Basins.

'Throughout Eocene times the shoreline lay to the west of the Wealden District. The positions of the shorelines varied considerably as they first advanced and then retreated as a result of earth movements'.

'The fauna and flora of the Eocene period contain several distinct elements. In the marine environments, endemic molluscs are mixed with terrestrial plant and vertebrate remains brought into the basin by strong river currents. In the early Eocene times the flora indicates a temperate climate which gradually changed until London Clay times when land areas were fringed with lush subtropical vegetation'.

This then is where our Bagshot Sands come in, and where sadly Atkins and Sallnow failed me, but at least they got me this far and the Victoria County History was able to continue the story.



Based on Atkins & Sallnow's illustration of the structural evolution of the Weald, showing the folding of the various beds of Hastings Beds, Weald Clay, Lower Greensand, Gault and Upper Greensand, Chalk and Tertiary Rocks (including the Bagshot Sands).