Geological Walks in the Dorking Area

Walk 1: Ranmore to Westcott - a circular walk

Length ~4½ miles (7¼ km)

Map: OS Explorer 146 - Dorking, Box Hill and Reigate 1:25,000

The varied and outstandingly beautiful scenery and vegetation of the Surrey Hills is dependent upon the different kinds of underlying rock. In the Dorking area, these are almost entirely of Cretaceous origin, ranging from about 116 to nearly 70 million years in age. They include sandstones, chalk and clay – all sedimentary rocks.

Several walks may be made, not only to cover all these rock formations, but also to visit sites of particular interest. Some of these are designated Regionally Important Geological/ Geomorphological Sites (RIGS) and are protected and maintained because of their educational importance.

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This walk involves a descent of the steep scarp face of the North Downs (slippery after heavy rain) from the Upper Chalk to the Folkestone Sands, returning by an alternative route. Visits to 2 RIGS are included.

Start: Ranmore Common Denbies Hillside Car Park (N.T., free to members). Map ref. TQ142504.

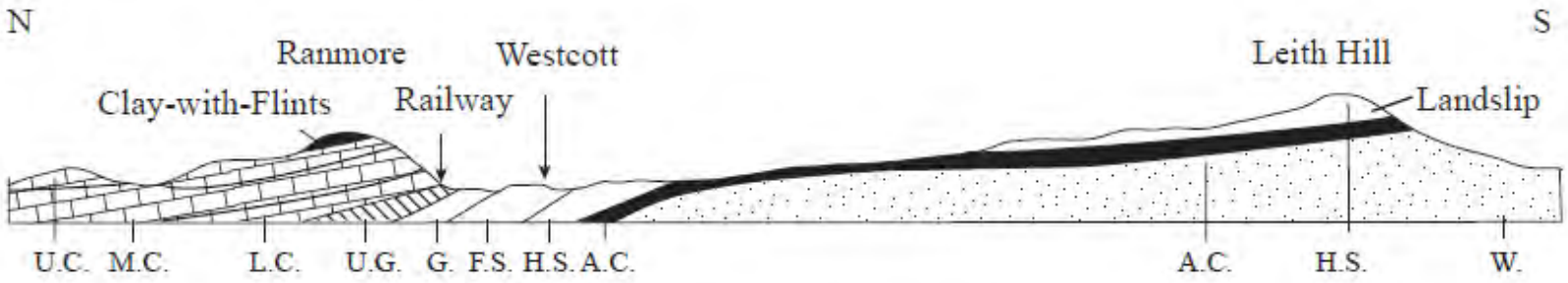
Enter Steers Field by the swing gate. Walk ahead on the path parallel to the hedge on the L, on level ground until you have a good view to the S across millions of years of the Cretaceous period of Earth history.

1) You have walked across a deposit known as **Clay-with-Flints** which covers the eroded surface of the underlying Chalk. *It is a Pleistocene deposit, less than 2 million years old, derived from a mixture of flint from the eroded Chalk and clay from Tertiary clays (65 - 2 million years old) which once covered the Chalk.* Clay-with-Flints covers much of the N Downs and supports extensive woodland. It accounts for the extreme stickiness of the surface after heavy rain.

2) To the S are two parallel ranges of hills, the **Greensand Hills**. *The furthest and highest is the older and is composed of* **Hythe Sands** *laid down in marine conditions. It contains hard bands of sandstone and* **Chert** (*a mineral similar to flint*) *which have enabled these hills to resist erosion*. Leith Hill Tower can be seen on the skyline in a gap in the trees, slightly to your R, and marks the highest point at 294 metres. L of the Tower, a dip indicates the origin of the Pippbrook, a stream which flows diagonally westward down to Westcott village, where it turns eastward to join the R. Mole at Dorking. The much lower, nearer and younger range of hills is of **Folkestone Sands**, another marine deposit. *Irregular bands of black ironstone called* **Carstone** *offer resistance to erosion*.

The broad and fertile Vale of Holmesdale, separating the Greensand Hills from the N Downs is floored by **Gault Clay** and **Upper Greensand**. To your L, the R. Mole and its tributaries have worn away the Greensand to give a view across the **Weald Clay** to the high ground of the Central Weald and (in clear conditions) to the South Downs.

3) Walk downhill on the Upper Chalk to a gate into woods. *Upper Chalk is a pure white soft limestone containing flints.* There used to be pits on Ranmore Common from which flints were taken to face houses and walls in the area, which can still be seen.



U.C.	Upper Chalk
M.C.	Middle Chalk
L.C.	Lower Chalk
U.G.	Upper Greensand
G	Gault
F.S.	Folkestone Sands
H.S.	Hythe Sands
A.C.	Atherfield Clay
W.	Wealden

Diagram 1. Cross-section from Ranmore to Leith Hill

4) Continue through the gate down a very steep path on Middle Chalk, *also white but with fewer flints in the upper layers only*. You will see these lying on the surface from which they have been washed out.

5) Cross a broad track and descend steps to a gate. Follow the path across an open field on Lower Chalk *which is grey without flints except those eroded from above***.** Cross the railway track with great care. Trains are more frequent than you may expect.

6) The railway marks the junction between the Lower Chalk and **Upper Greensand**. This forms a low narrow escarpment along the base of the North Downs used for growing cereal crops. *When freshly exposed, Upper Greensand is greenish in colour due to the presence of the mineral glauconite but weathers to a pale buff colour. East of Dorking it contains bands of fine-grained calcareous sandstone called Reigate Stone, which was formerly used as a building stone but weathers badly*.

7) On the far side of the stile in the hedge ahead is an E-W ditch marking a spring line along the junction between the Upper Greensand and the underlying Gault clay. Water draining through the Chalk and Upper Greensand cannot penetrate the clay and is forced to the surface. The **Gault** forms the rising ground ahead and supports lush grass for grazing cattle.

8) Follow the path through 2 fields to the stile at the top of the rise. Here is the junction between the Gault and the upper part of the **Lower Greensand**, called the **Folkestone Sands**. These are dry and not very fertile. Continue along the track to the Pippbrook.

9) Go over the stile on the R and walk westward by the stream over alluvium. These water-meadows are used for grazing cattle and sheep.

10) Cross the stream by the 3rd bridge on the L and follow the footpath up to the main road, A25. You are now in the centre of Westcott, where refreshments may be obtained.

11) Walk westward along the A25 to Holy Trinity Church. Note the walls of **knapped flints** cut to show their interior colour. Take the road on the L of the church, noting the Carstone of the Folkestone Sands in the R.H. bank.

12) At the top, take the footpath on the R over Westcott Heath. The walls of the house on the L are faced with **Bargate Stone** from the Hythe Sands, here ornamented with small pieces of Carstone. This is called galletting.

13) Cross the road and continue on the path bearing L downhill on the Greensand Way. Note how the colour of the sand on either side changes from pale to bright orange due to the high concentration of iron in these Folkestone Sands. Large pieces of Carstone can also be seen.

14) Coast Hill Quarry (Surrey RIGS No. 011/92). On the R of the path, just off the A25, is a disused pit in the Folkestone Sands where you can examine closely the irregular veins and pipes of ironstone. Pieces of it are found in walls in the area. Changes in colour intensity of the sand show leaching of iron by the downward flow of moisture.

15) Turn L along the A25 and walk uphill on the footpath to see the next RIGS - **Coast Hill, Westcott (Surrey RIGS No. 19/93)**. The Bargate Beds

can be seen for about 40 m, above a low wall. When this ends they continue to rise from the ground for another 40 m, their height varying between 3 m and 6 m. The section appears to dip eastward towards Dorking.

16) When the footpath ends, cross the road (**with extreme care**) and continue uphill on a footpath. Further on, the Hythe Sands can be seen across the road on the S side. They are of typical brown colour with bands of chert. Thus the older underlying Hythe Sands appear above the younger Bargate Beds. This is due to a fault crossing the road near the top of the hill. The downthrow is estimated at 15-20 m.

17) Return on the N side of the road to Balchins Lane on the L. This marks the turning point of the walk. Note that the garden wall here contains several kinds of stone - Carstone, Bargate Stone, a reddish stone from Leith Hill and even some shiny black slag, a reminder of past times when there was a thriving iron industry in the area.

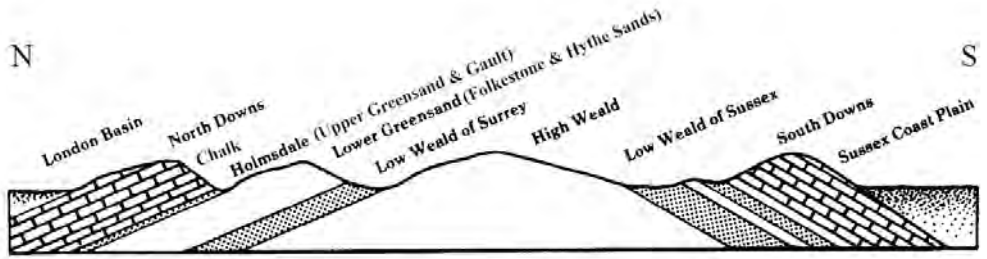
18) Go along Balchins Lane to the R-hand bend by a 30 mph sign. Cross the stile on the L and take the R.H. path. Keep R to a stream (2 stiles with a bridge between) and on through a small wood to open fields on the Gault, then on to the spring line again and the Upper Greensand.

19) Turn L at a signpost at a broad track leading uphill to the railway. Cross onto the Lower Chalk and uphill to a junction of paths.

20) Take the R.H. path leading diagonally upward and in about 50 m take the R.H. (NT) path. Go through the gate and along on Middle Chalk. There are fine views of your outward route from this path, which gradually climbs open downland supporting a beautiful display of wild flowers and butterflies.

21) Finally, ignore a gate into the wood on your L and continue along its outer edge. About 30 m past the end of the wood find a gate into Steers Field. Follow the path upward to your starting point.

Between the Upper Chalk and the Bargate Beds you have crossed and re-crossed about 115 million years of geological history.



CROSS-SECTION NORTH TO SOUTH THROUGH S.E. ENGLAND

An Outline of the Formation of the Weald

Lower Cretaceous (c. 135 million years ago)

Wealden Beds. The Wealden Beds were laid down in a vast fresh to brackish water lake connected to the sea in the area of Central France. Three huge rivers, which were probably braided, flowed into it from the N, N-E and W, and sediments were laid down in the deltas of these rivers. Changes in climate and sea-level resulted in the deposition of different kinds of sediments. Over 760 metres of sands, silts and shales with Weald Clay as the youngest deposit make up the Wealden Beds.

Lower Greensand. The Wealden Lake developed a wider connection with the sea and became a shallow marine bay. Uplift of the surrounding land areas led to deposition of silts and sands.

Gault and Upper Greensand. A wide marine transgression which swept northward and westward pushed the shoreline to the borders of Wales and N England. Gault Clay was laid down in the quieter waters further from the shoreline, while Greensand was deposited nearer the shore.

Upper Cretaceous (c. 100 million years ago)

Chalk. Subsidence of much of Central and Western Europe resulted in a vast shallow sea, the Tethys Sea, covering most of Britain. Great thicknesses of white calcareous mud, now called Chalk, were laid down. The climate at this time was hot and dry and the land bordering the sea was desert with few rivers. Chalk is composed mainly of coccoliths - minute calcareous bodies of planktonic algae - together with the shells of various other marine organisms. The Chalk has three sub-divisions.

Tertiary (c. 70 million years ago)

At the end of the Cretaceous, earth movements uplifted the bed of the Tethys Sea, converting the Wealden area to a low island which gradually became eroded. More uplift took place as part of the earth movements which produced the Alps and Himalayas. Finally, the sea advanced to the edge of this uplifted area, and other beds, including the London Clay, were laid down.

The **Clay-with-Flints** which covers the Chalk of much of the Downs contains flints derived from the eroded Upper Chalk.

Quaternary - Pliocene and early Pleistocene (began 12 million years ago)

The Weald was now a dome-shaped island becoming denuded by weather and drainage. Rivers poured off it and it was at this stage that the courses of the rivers were imprinted on the landscape. The Medway, Mole and Wey flowed northward, while the Arun, Adur, Ouse and Cuckmere flowed southward. Erosion of the softer rocks of the Central Weald and down-cutting of these rivers through the Chalk resulted in the gaps in the Downs which are present today.

Ice-Ages (began c. 1 million years ago)

Although the glaciers of the Ice Ages probably reached no further than North Finchley in N London, the Weald was in the characteristic periglacial state of 'permafrost', with a permanently frozen subsoil and a seasonally thawing topsoil. Frost shattering was responsible for the erosion of much rock from the slopes of the escarpments.

During warmer periods, melt-water draining over the permafrost carved out deep valleys. At the end of the last Ice Age (about 10-15,000 years ago) these were left as dry valleys or combes. The lowering of the water table which resulted in the drying up of springs, and the lower rainfall compared with that of the past, have also contributed to the formation of combes.

Separation of Britain from Europe took place about 6,500 years ago.