



## Geological Walks in the Dorking Area

### Walk 4: Burford Bridge to Box Hill Summit – a circular walk      Length ~2½ miles (~4 km)

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

This walk includes a steep ascent of the river cliff

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.



Hythe Sands

Folkestone Sands

DORKING

Gault

Upper Greensand  
Lower Chalk

Middle Chalk

Upper Chalk

Apart from the ½ mile stretch between Burford Bridge and the Stepping Stones, which is on alluvium, this walk is entirely on **Chalk**. Chalk is composed mainly of coccoliths - minute calcareous bodies of planktonic algae - together with the shells of various other marine organisms. It has 3 subdivisions. Box Hill Country Park is a well-known area of the North Downs, owned and managed by the National Trust. The chalk environment provides habitats for many chalk-loving species, hence Box Hill is designated an S. S. S. I. – a Site of Special Scientific Interest, not only for its geological importance, but also for its plant and animal wildlife.

**Start A: Rykers Car Park on the B2209 just N. of Burford Bridge Hotel, Westhumble, near Dorking (Map ref. 172521). Not recommended on Sundays as it is a meeting place for bikers      OR**

**Start B: The Stepping Stones Car Park (Map ref. 171514). This is a small car park down a short track by a bus stop on the E side of the A24, about 0.3 mile S of the Burford Bridge roundabout. Alternatively it can be reached by walking from Dorking Station (¾ mile), Deepdene Station (c. ¾ mile) or Boxhill and Westhumble station (c. <¾ mile). N.B. Not all trains stop at the latter station.**

**1)** If starting from **A**, cross the road from Rykers Car Park and walk past the hotel to the Burford Bridge roundabout. Cross the bridge over the R. Mole and go along the A24 for a short distance to the underpass. Take the footpath leading down on the L to a gate which opens onto Burford Meadow on the flood plain of the river. Follow the path up-river on its L bank to a wooden bridge.

**2)** Cross over and continue upstream to the Stepping Stones at **3**. If starting from **B** either cross by the Stepping Stones to **3** or, if preferred, walk downstream along the path from the N side of the car park to the wooden bridge at **2**, cross it and return upstream to **3**.

**4)** Turn your back on the river, walk forward on the path leading to the massive cliff and begin your ascent. For a short distance you will be walking on **Lower Chalk**, the oldest division of the Chalk, which is greyish in colour with muddy impurities and no flints.

**5)** As the path rises steeply to the right, you will notice that the Chalk is much whiter. You are now on **Middle Chalk**, a division which has very few flints except in its highest layers. On your way up, notice the plants which

thrive on Chalk growing on the cliff-side - Box, Yew, Travellers' Joy (Old Man's Beard), Deadly Nightshade.

**6)** About half way up you will find a good view-point at which to pause for a brief rest. Look W-ward across the Mole Gap to Ranmore Common, a continuation of the North Downs. To the L you will also see a flat-topped **spur or terrace** which, at about 61 mOD, corresponds to the pre-Ice-Age floor of the river. At the end of the last Ice-Age, about 10-15,000 years ago, the ice gradually melted, thus reducing the pressure on the underlying rock. Uplift of the land took place and the river began cutting down again to its present level of about 30 mOD. The spur and the S- and E-facing hillsides are now occupied by Denbies Vineyard, the largest in England.

**7)** Continue to the top of the path. The higher section of the cliff is of **Upper Chalk**, pure white with many flints. Your climb has taken you through about 30 million years of Earth history.

**8)** At the top, turn R and walk to the viewpoint just below the summit of Box Hill on its scarp face, which is open grassland supporting a large variety of Chalk-loving wild flowers, including several species of orchid. From the viewpoint, look S. On a clear day it is possible to see the S Downs in the far distance. The wooded and ridged high ground of the Central Weald is also in view and the intervening flattish land is **Weald Clay**. To your R, beyond Dorking, are the **Greensand Hills**. The further, higher range is of **Hythe Sands** with Leith Hill tower marking its highest point at 294 m, while the nearer, much lower range on which much of Dorking is built, is of **Folkestone Sands**. The presence of **Chert** in the former, and **Carstone** (ironstone) in the latter, have helped to slow down erosion. The E-W lowland between the Greensand Hills and the Chalk of the N. Downs is called the Vale of Holmesdale and is floored with **Gault Clay**. The low, narrow scarp between this and the scarp of the Chalk Downs is **Upper Greensand**. Thus, from this viewpoint, the history of the landscape in front of you, from about 135 million years ago to about 70 million years ago can be seen.

**9)** Turn and walk a little further uphill to the road and go L along it to the Fort where refreshments and toilets are available, together with a National Trust shop and useful information about various aspects of Box Hill. *At this point, those wanting a longer walk can explore the various paths leading off the Donkey Green, a large field opposite the Fort.*

**10)** To start back down the long dip-slope of the N. Downs, walk along the path by the side of the Fort car park. (This one is for N. T. members only.

There is a large public car park on the opposite side of the road.) As you walk through the woods you are on the deposit known as **Clay-with-Flints**, which covers much of the N. Downs. This is thick enough to support extensive woodland, especially beech. The deposit can be easily seen by inspecting the roots of fallen trees. The clay is yellowish-grey and contains many broken pieces of flint derived from eroded Upper Chalk.

**11)** This path finally emerges from the trees to a wide, bare, Chalk path. Fossils, usually in broken pieces, of various marine creatures can sometimes be found on the surface, particularly after the rains of winter. These include echinoids, bivalves, etc. An excellent view of the Mole Gap is obtained from here. River, rail and road all run through this gap in the Downs which has been created by the river.

**12)** To your right is one of the many steep-sided dry valleys of Ice-Age origin found cutting into the dip-slope of the N. Downs. The **Ice Ages** began about 1 million years ago and although the glaciers 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. 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 coombes**. 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 coombes. Continue downhill to regain the B2209, either:

**13)** straight down the steep chalky path to your left, or

**14)** the more gentle but longer slope to your right.

To regain the Stepping Stones car park, follow the directions under **Start A**.

For more detail on the geological history of this area, see "Walk 1 – A Circular Walk from Ranmore to Westcott".

Abbreviations:     m     = metres  
                          O. D. = Ordnance Datum (for height above sea level)

## 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.

