

Geological Walks in the Dorking Area (Walks 2 & 3)

Walk 2: A Walk in the Mole Gap: Terraces & Swallow Holes (Length 2½ or 3½ miles / 4 or 5½ km)

A circular walk with one short fairly steep climb and including one designated RIGS (Regionally Important Geological / Geomorphological Site).

Map: OS Explorer 146 - Dorking, Box Hill and Reigate 1:25,000
(4cm to 1km - 2½ ins to 1 mile)

Start A: Rykers Car Park on the B2209 just N of Burford Bridge Hotel, Westhumble. Map ref: TQ172521. Not recommended on Sundays as it is a meeting place for bikers. Distance: 3½ miles return.

Start B: Boxhill and Westhumble railway station. Map ref: TQ167519. Limited parking. Please note: not all trains stop at this station. Distance: 2½ miles return.



Cut-off meander

compiled by P. F. Pitkin, 2003 ©

Introduction

The River Mole rises near Gatwick Airport to the S and flows more or less northward joined by a number of small tributaries. At Sidlow Bridge it turns NW then W. Just E of Dorking it swings N again through a gap in the N Downs and eventually flows into the Thames at Molesey.

This walk, through a section of the Mole Gap, will help you to understand the history of the stretch of the river and so explain the topography.

1) Start A: From Rykers Car Park cross the road and walk past the hotel to the Burford Bridge roundabout. Cross the bridge over the river and walk along the A24 for a short way to the underpass. **Use this to cross the A24.** You will emerge close to Westhumble Street which leads to Boxhill Station. Note the use of flints in walls. These are derived from the Upper Chalk. Because the flints are of irregular shape and so need a lot of mortar to hold them in place, the walls are reinforced at intervals with brick pillars.

2) Start B: At the station take the footpath opposite the car park and follow it through a gate to a large field.

3) You are now within the southern end of the **Mole Gap** which is a very important communications route between the S coast and London, and carries both the railway and a major road (A24) as well as the river. The history of the river Mole may be said to have begun about 12 mya at the beginning of the *Quaternary period* when the Wealden area was a huge dome-shaped island extending across to central France. Britain did not finally separate from Europe until about 6,700 years ago. The dome was uplifted from the great Tethys Ocean, in which the Chalk had been deposited, as a peripheral part of the earth movements which elevated the Alps and the Himalayas. The Wealden island gradually became 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. 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. The Arun, Adur and Ouse flow S-ward while the Medway, Mole and Wey flow N-ward.

4) Keep to the L.H. upper edge of the field to a gate in the corner. Continue uphill through woods until you reach a flight of steps going down to the river.

5) You are now on **Ham Bank**, a cliff 21.3m (70 ft) above river level. This *terrace* is the remnant of an old pre-Ice Age valley floor at the 61 mOD

(200ft) level, i.e. 61 m above mean sea level. The terrace forms the summit of many hills in the London Basin and represents a plain formed by river action 1-2 million years ago in Pleistocene times before the onset of the Ice Ages about 1 myr. Although the ice probably reached no further S than N Finchley in N London, the Weald was in the characteristic periglacial state of "*permafrost*" with a permanently frozen subsoil and a seasonally thawing topsoil, as seen in Northern Canada and Siberia today. *Frost shattering* was responsible for much erosion of rock faces. When water in cracks in the Chalk freezes, the ice expands and shatters the rock which then flakes off when the ice melts.

6) Look down at the river. The bed of the Mole is now well below the level of the pre-Ice Age floor due to down-cutting at the end of, and after, the Glacial period. As the ice melted the weight on the land lessened. The land rose and the rivers cut down again.

7) Walk on along the path, noting how the continual undercutting of the L.H. (outer) bank of the river, due to the large bend or *meander* in its course, has formed a steep cliff. Similar cliffs can be seen across the other side of the Gap where the Mole swings the other way, at Cowslip Bank and "The Whites" (the huge river cliff forming the W side of Box Hill, which dominates the landscape).

8) At Lodge Farm bridge you have a closer view of the cliff face and the river. If the water is very low, a swallow hole may sometimes be seen here just below the cliff. Water flowing over Chalk can escape down small cracks called *swallow holes*. These are easily choked by silt and debris except where erosion at the foot of a meander cliff exposes fresh fissures in the Chalk. You may be able to see a swirling of water carrying debris above one of these swallow holes. Normally there is enough water flowing to maintain a continuous stream on the surface. However since the *water-table* (the height to which the rock is saturated with water) is some way below the river bed in this stretch, in times of drought the water seems to disappear, though in fact it is still present, moving through the interstices of the Chalk well below the river bed. After rain, when its rate of flow returns to normal, the stream reappears. It has been said that this habit of seeming to disappear underground has given the Mole its name. Interesting measurements taken some years ago before flood controls were put in place higher up the river are:

The average flow of the Mole above Burford Bridge was 63 m.g./day. The average flow of the Mole lower down at Leatherhead was 55 m.g./day. Thus

there was a loss of 8 m.g./day. Some of this loss was due to evaporation from the surface and seepage into the banks, but most must have been due to the swallow holes. There are about 20 known swallow holes in this stretch of the river. Below Leatherhead the flow was 98 m.g./day. This increase is partly due to water entering from the springs at Fetcham, but also because the river bed is now at the level of the water table.

9) Continue along the path running behind (i.e. to the L of Lodge Farm to a picnic area. Turn R along the path running E across a bridge over the Mole at Swanworth Farm, R again along Cowslip Bank, again on the 61 m terrace level and underneath the railway to Cowslip Farm. You are now returning along the R bank of the river.

10) Cross the river again by the bridge at the side of the railway bridge. Note the interesting brick-work of this bridge, due to the bridge lying slantwise rather than at right angles to the river. When it was built, the U-shaped meander which you can see on your R was artificially cut off from the Mole to improve the water flow in times of heavy rain, so protecting the bridge. The meander has now been reconnected and tidied up (obscuring some former geological features) though to what purpose is unclear. There is a record of at least one swallow hole in this meander on the far S side. The meander is designated as a RIGS (Surrey No. 014/92). In very wet weather it fills with water.

11) Looking ahead to where you began the walk you will see a low terrace partly crossing the field, at 35 mOD (115 ft). The Mole here is at 30.5 mOD (100ft). This terrace may mark another phase in down-cutting.

12) Continue to the gate leading to the path back to the station

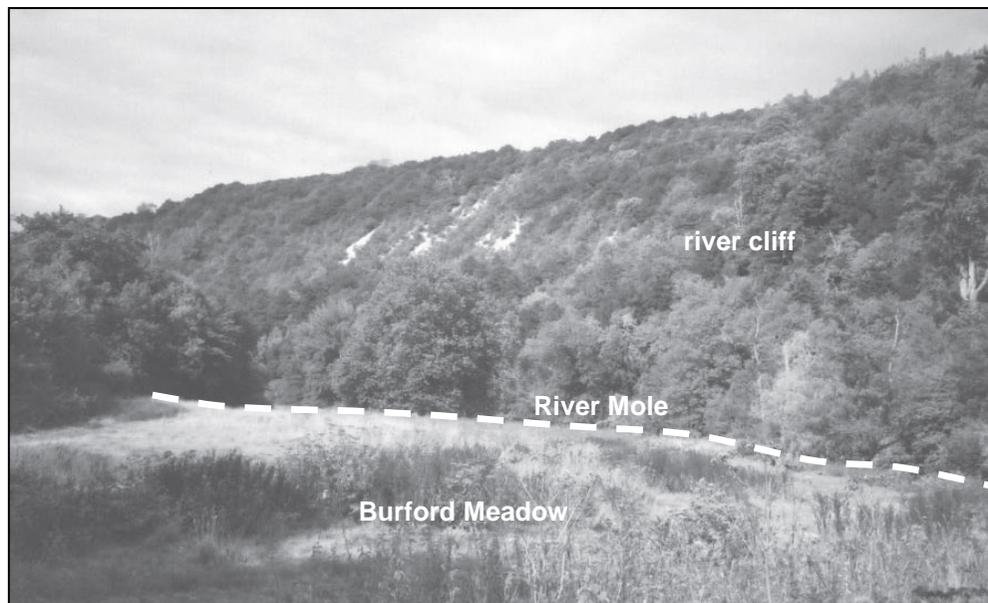
Abbreviations: m = metres
OD = Ordnance Datum (for height above sea level)

Walk 3: A Walk in the Mole Gap: Solution Holes

Burford Meadow - Stepping Stones (Includes 1 RIGS)

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

This walk may be followed either as an extension of Walk 2 or as a short riverside stroll of about 1¼ miles (2 km). If the latter, it may be begun at the Stepping Stones and the route followed in reverse. There is a small car park down a short track by a bus stop, off the E side of the A24 about 0.3 mile S of the Burford Bridge roundabout. Map ref: TQ171514.



Burford Meadow and river cliff taken from footbridge (para. 3) looking N.E.

1) Start: A few metres past the bridge over the Mole (see Walk 2) is a gate on the L leading to Burford Meadow on the flood plain of the river. Walk up river on its L bank to see the effects of erosion on the river cliff as the water sweeps round the meander. Trees and bushes growing on the cliff side have become loosened and some can be seen in the water. Bare gaps in the Chalk left by them have resulted in Chalk scree rolling down the cliff.

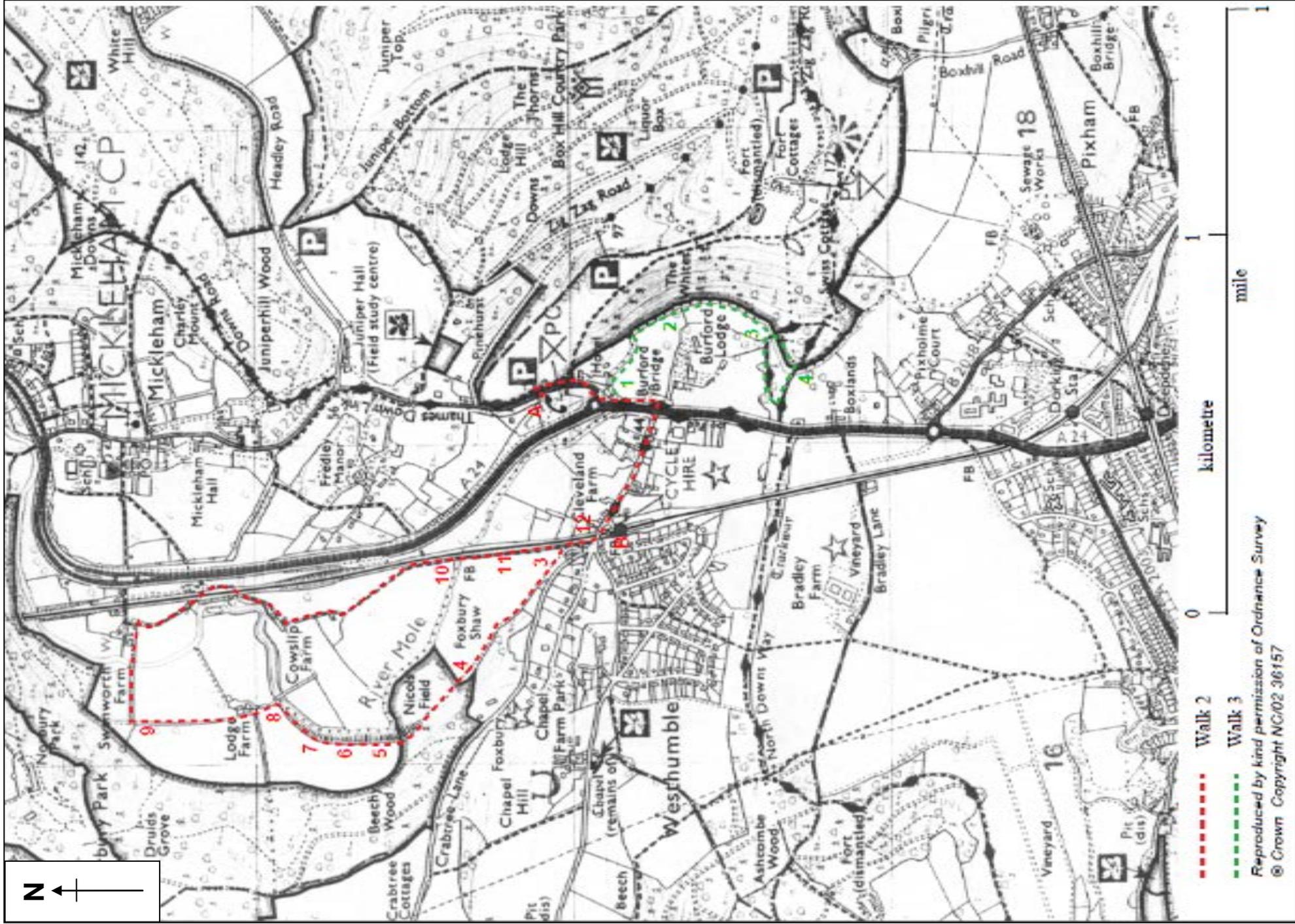
Evidence of flooding in times of prolonged heavy rainfall can also be noted in the debris caught up in low hanging branches above the river.

2) In the meadow itself you will see several deep depressions with small trees and bushes growing in them. These are *solution holes*. They are not large as in the limestone areas of Yorkshire and Derbyshire for example, as Chalk is softer and tends to collapse into the cavities forming surface subsidence as deep dells. They could be termed "fossil swallow holes", left behind by the eastward migration of the R. Mole as the meander cut into the side of Box Hill, forming the spectacular river cliff. For this reason, Burford Meadow has been designated a RIGS (Surrey RIGS No. 12/92). There are also 3 solution holes under the Burford Bridge roundabout. These were impracticable to fill, so are covered by a steel "umbrella".

3) At the the far end of the Meadow is a bridge over the river (see photo) and you now have a choice of paths: **a)** cross the bridge and continue up-river on the R bank; **b)** do **not** cross the bridge, but continue on the path on the L bank.

4) These paths end at the Stepping Stones, on opposite sides of the Mole. The car park is a short distance up the track leading from the L bank (W side), if you have parked there, or you can return to Burford Bridge.

PLEASE NOTE: If the river is high, it is unsafe to cross by the Stepping Stones, especially if they are wet.



— — — — — Walk 2

— — — — — Walk 3

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