Geological Basis of the Folkestone and Hythe area

The Folkestone area can be thought of as consisting of four regions of diverse topography (the Downs, the Warren, the Lowlands and the Marsh) which can be clearly seen from the many fine vantage points on the North Downs overlooking the town.

These main regions, each with characteristic flora and fauna, owe their nature to the underlying rocks, and their form to geological history, especially that concerned with uplift, bending, accretion and erosion.

The geology of the Folkestone and Hythe area can best be understood when viewed within the broader context of the structural pattern of South-east England. This whole region is composed mainly of the rocks of the Secondary era (Jurassic and Cretaceous) overlying a deep Palaeozoic platform, but the surface geology is essentially concerned with the younger Cretaceous rocks, a sequence of the component formations being easily identifiable in the vicinity of Folkestone.

In essence the South East is structurally a major anticline, or upfolded arch, formed during the Alpine folding with a main axis trending from west to east, but within this broad framework there are naturally innumerable minor features which can be most important in a local sense. In early Tertiary times the elongated dome formed a low island of chalk between shallower seas, in which sediment was deposited to become the rocks of the present-day basins of Hampshire and London. Marine action slowly planed off the crest to expose the older underlying rocks and the relief as we know it today, that of an eroded core surrounded by inward facing scarps, is a direct result of the varying powers of these different older rocks to resist the consequent denudation and the continuous sculpturing by rain and rivers.

The original streams followed a natural pattern, flowing to the north and south away from the higher east-west ridge in the centre, cutting valleys in the gently dipping chalk. Once the underlying central beds were revealed, subsequent streams, tributary to the main rivers, carved valleys at right angles along the more easily eroded clays. Thus, while tributaries were eroding the clay vale along the foot of the scarp face of the North Downs, the main rivers were concentrating on cutting such gaps through the chalk as the Stour and Elham valleys.

Of course, the basic drainage pattern is much complicated by such other factors as changes of sea-level, river capture, the influence of the tundra conditions during the Great Ice Age, and the break-through which formed the Straits of Dover. It was this separation of Britain from the Continent which isolated the eastern end of the anticline, the chalk cliffs of France being easily visible from the Kentish coast, and created a coastline in the Folkestone area which exposed a cross-section through much of the Cretaceous system.

From west to east, a series of strata can be seen dipping in turn beneath successively younger rocks. From Lympne towards Dover, from the old cliff-line (above the more recently added levels of Romney Marsh), the Wealden Clay, the Lower Greensand (geologically divided into the Hythe, Sandgate and Folkestone Beds), the bluish clay of the Gault, and finally the high cliffs of chalk can be seen.

Behind the long shingle ridges formed of material eroded from the cliffs of the Hastings beds to the west of Rye, Romney Marsh has been formed both through the natural silting action of rivers such as the Rother and through artificial reclamation, or 'inning', probably started in Roman times. This area is only a few feet above sea-level, and made up of vast areas of fertile silt and infertile gravel.

Between the marsh and a minor escarpment (the old coastline) which runs westward from Hythe, is the Royal Military Canal built as a defence against Napoleonic invasion which never occurred.

Near Hythe, the blue-grey Wealden Clay, eroded throughout much of the Weald into a broad valley, disappears beneath a narrow clay belt and the first of the major Lower Greensand Beds. The sandstones of

the Hythe Beds which form the hills behind the town of Hythe and as far as Seabrook, include bands of sandy limestone, known as Kentish Rag or Ragstone.

Next in sequence the dark sandy clays of the Sandgate Beds continue the gentle dip to the north-east and, after supporting Sandgate itself, appear again in much of the lower cliff face of the Leas at Mill Point. Small streams eroding headward from the coast have cut quite deep valleys inland across these strata and consequently break the smooth pattern of relief. Landslips, normally resulting from drainage difficulties, are frequently a problem in this area.

The town of Folkestone rests almost completely on the Folkestone Beds, rather soft, fine, light brown or greenish sands, sometimes with intervening bands of calcareous sandstone and irregular seams of ferruginous carstone. These form most of the Leas Cliff face and are well exposed at East Cliff, backing the beach and promenade to the east of the harbour area, although sometimes cut by gully erosion and occasionally overlain by small fans of clay brought from the Gault which appears in the upper section of the cliff there.

These blue Gault clays dip gradually eastwards until they constitute the classic exposure of the whole cliff face at Copt Point before disappearing, in turn, beneath the chalk. The deposition of large thicknesses of mud on top of the Lower Greensand Beds, the junction being marked by a bed of phosphatic nodules, has formed a series of clay beds which are probably the most interesting and best known of all the geological formations in the area. The rich and varied fauna of the Gault Sea has resulted in a wide range of easily accessible fossils, often in an excellent state of preservation. The principal fossil is the ammonite and, because of the correlation between species and strata, it is used as a reliable guide on which to base the subdivision of the Gault into zones, through the pale grey marls at the top to the very dark clays near the base.

Beyond Copt Point is the Warren, an area of very confused relief lying between the high chalk cliffs of the North Downs and the sea. Here huge masses of chalk and the underlying Gault have slipped seawards with a semicircular rotatory movement about a horizontal axis, probably because marine erosion of the Gault 'toe' meant that there was insufficient support for the mass of chalk above. Inland, the Gault outcrops in a relatively narrow belt along the foot of the chalk scarp, often partially covered by material eroded from the steep slopes above.

From the scarp eastward, the chalk beds exposed along the high cliffs between Folkestone and Dover are mostly of the Lower Series, very grey when compared with the white chalks of the Upper Series which appear in the cliffs east of Dover. The chalk is a remarkably pure limestone mostly composed of accumulations of microscopic plant life, although also containing many types of fossil remains. The silica flints which occur in such prominent sands and nodules, probably accumulated in the chalk after its formation, and their relation to the pervious chalk can clearly be seen in all the cliffs. At the foot of the cliffs are wave-cut platforms and rock pools.

Inland, the soft, rounded relief of the chalk countryside forms a landscape of distinctive beauty.

The landscape's dynamic nature is well portrayed on the coast. The complex interaction of natural and man-made forces can be seen with the sea-wall at Hythe Redoubt, the concrete and rock sea defences between Hythe and Mill Point, and the regularly-spaced groynes intended to prevent the steady eastward longshore drift which emphasises the resultant strength of different wave action - one result of which is the large accumulation of shingle to the west of Folkestone Pier. The most dramatic change to the landscape of the area in recent history, however, was the construction of the Channel Tunnel, and the formation of Samphire Hoe from the resultant spoil.