

are generally very regular and flat, and can be easily raised in slabs from the quarry. When the lias beds, with their associated beds of clay, are fully developed, they form a mass of stratified limestone and clay, several hundred feet in thickness, which rests upon the red marl described in the preceding chapter.

The regularly stratified lias limestone occupies the lower part of the bed, and the lias clay the upper. The lower beds of the limestone have often a yellowish white colour, and are called white lias. The blue lias limestone has, generally, a dark smoke-grey colour, a dull earthy texture, and an imperfectly conchoidal fracture: the purest beds contain from 80 to 90 per cent. of carbonate of lime, combined with bitumen, alumine, and iron. If iron enter largely into the composition of this limestone, it forms a lime, which when burned, has the property of setting under water.

The finer kinds of white lias will receive a polish, and may be used for lithographic drawings. Between the lower lias limestone and the lias clay, there occur, in some situations, beds of sandy lias, with layers of ironstone in nodules: this part of the lias formation has been called *marl-stone* in some of the midland counties.

The lias clay frequently occurs in the form of soft slate or shale, which divides into very thin laminæ. This shale is often much impregnated with bitumen and with iron pyrites, and will continue to burn slowly when laid in heaps with faggots, and once ignited: during this slow combustion, the iron pyrites are decomposed, the sulphur combines with the oxygen of the atmosphere to form sulphuric acid, and this combines with a portion of the alumine in the shale, and forms sulphate of alumine or alum. The alum shale of Whitby in Yorkshire is of this kind; it has rather a soapy feel, and a slight silky lustre. When the lias clay or alum shale falls, in large masses, from the cliffs upon the sea shore, and becomes moistened by sea water, it ignites spontaneously and continues burning a considerable time. About the middle of the last century, the cliffs of lias clay near Lyme, in Dorsetshire, took fire after heavy rains, and continued burning for several months: at the present time, a hill near Weymouth is ignited by a similar cause; it is composed of bituminous clay with pyrites, but it is an upper bed in the oolite formation called Kimmeridge clay.

Lias clay is impregnated with a considerable portion of muriate of soda, and sulphate of magnesia and soda. The mineral springs of Cheltenham and Gloucester rise in this clay; but the mineral qualities decrease after the springs have been opened some time, which proves that the saline matter is derived from parts of the bed adjacent to the springs, and is therefore soon exhausted.

The beds of lias clay and limestone are particularly distinguished by the number and variety of the organic remains which they contain. Twenty different kinds of ammonites have been discovered in lias, and also nautilites, belemnites, and other species of chambered