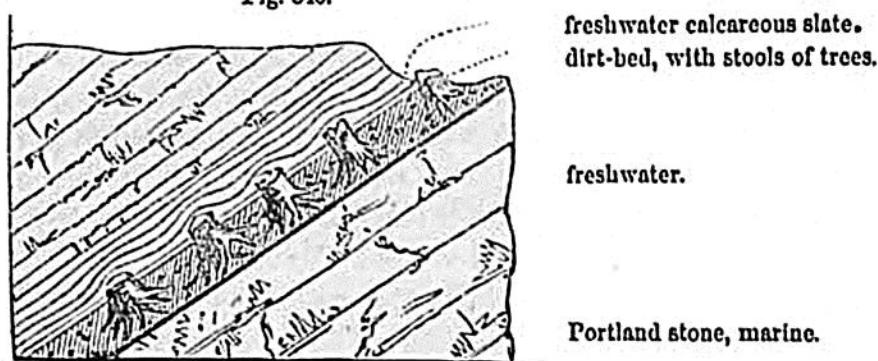


The thin layers of calcareous slate (fig. 342) were evidently deposited tranquilly, and would have been horizontal but for the protrusion of the stumps of the trees, around the top of each of which they form hemispherical concretions.

The dirt-bed is by no means confined to the island of Portland, where it has been most carefully studied, but is seen in the same relative position in the cliffs east of Lulworth Cove, in Dorsetshire, where, as the strata have been disturbed, and are now inclined at an angle of  $45^\circ$ , the stumps of the trees are also inclined at the same angle in an opposite direction—a beautiful illustration of a change in the position of beds originally horizontal (see fig. 343). Traces of the dirt-bed have also been observed by

Fig. 343.



Section in cliff east of Lulworth Cove. (Buckland and De la Beche.)

Mr. Fisher, at Ridgway; by Dr. Buckland, about two miles north of Thame, in Oxfordshire; and by Dr. Fitton, in the cliffs in the Boulonnois, on the French coast; but, as might be expected, this freshwater deposit is of limited extent when compared to most marine formations.

From the facts above described, we may infer, first, that those beds of the upper Oolite, called "the Portland," which are full of marine shells, were overspread with fluviatile mud, which became dry land, and covered by a forest, throughout a portion of the space now occupied by the south of England, the climate being such as to admit the growth of the *Zamia* and *Cycas*. 2dly. This land at length sank down and was submerged with its forests beneath a body of freshwater, from which sediment was thrown down enveloping fluviatile shells. 3dly. The regular and uniform preservation of this thin bed of black earth over a distance of many miles, shows that the change from dry land to the state of a freshwater lake or estuary, was not accompanied by any violent denudation, or rush of water, since the loose black earth, together with the trees which lay prostrate on its surface, must inevitably have been swept away had any such violent catastrophe taken place.

The dirt-bed has been described above in its most simple form, but in some sections the appearances are more complicated. The forest of the dirt-bed was not everywhere the first vegetation which grew in this region. Two other beds of carbonaceous clay, one of them containing *Cycadææ*, in an upright position, have been found below it, and one