

mile in length and breadth. It seems evident that these basins have once been small lakes or marshes, and that the strata have been deposited on the bottom and sides, taking the concave form which depositions under such circumstances must assume : and it is deserving of notice, that the stratum of coal, which in one of these coal-basins at Hudswell is a yard thick in the lowest part, gradually diminishes as it approaches the edges, and then entirely vanishes. This fact proves that the present basin-shaped position of the strata was their original one ; and that the basin, at the period when the coal strata were formed, was a detached lake or marsh, and not part of the bed of the sea.

It has been supposed that coal strata were deposited on the bed of the ocean ; but this is not probable, for the vegetable remains, so abundant in the coal strata, belong to families of terrestrial or marsh plants, ferns, gigantic equisetums (horsetail), with jointed and striated stems like reeds, hence called calamites, and lycopodia allied to ferns : these compose the greater part of the fossil plants accompanying coal. In some instances, the coal is decidedly formed of such plants ; and, from the plants being sometimes found erect, we may infer that they grew near the place where they occur. There is a stratum of indurated shale and imperfect ironstone in the Yorkshire and Derbyshire coal-fields, called muscle-bind ; it is filled with shells : they resemble freshwater muscles ; and though there may be shells closely allied to them in form, in some of the marine limestones, it deserves notice, that the substance of the shells in the coal shale, at least wherever I have seen them in the Northern coal-fields, has that cretaceous or chalky appearance and consistence, which I have observed to be peculiar to shells in what are regarded as undoubted freshwater formations.

If the basins in which the coal strata are deposited were originally freshwater lakes or marshes, did any of the plants whose remains compose coal grow where the coal is now found ? or, were they carried by rivers or inundations into the lakes, and gradually deposited as the water evaporated ? The former is perhaps the most probable hypothesis ; and the occurrence of the same peculiar kind of fire clay under each bed of coal, favors the opinion, that this was the soil proper for the production of those plants from which coal has been formed. If we suppose that these lakes were periodically laid dry, and again filled by sudden inundations, we shall have the conditions required for the succession of carbonaceous and earthy strata that take place in a coal-field : a repetition of such inundations would fill up the lake or basin. Nor can such a supposition appear improbable ; for, as the species of vegetables in the coal strata are analogous to what at present grow in tropical climates, we may infer that they were subjected to such atmospheric influences as promote the rapid growth and decay of vegetation in hot countries, accompanied with great periodical inundations.