

In the history of common peat and drift wood, we see the origin of the beds of coal which exist in the older strata; for it needs only that the layers of peat (in which term we include submerged drift wood) should be bituminized, and the intervening layers of sand and mud be consolidated, in order to produce a genuine coal formation. Common marsh peat alone can have originated but a small part of the beds of coal.

#### CONSOLIDATION OF LOOSE MATERIALS.

Having described a variety of natural processes by which just such materials as form the fossiliferous rocks are produced, it remains to inquire whether any agents are now in operation to effect their consolidation.

A considerable degree of solidity is sometimes produced by mere desiccation.

When clay is exposed for a long time to the sun, it becomes as hard as some rocks:—*ex. gr.*, the marly clay dug from the bottom of Lake Superior. Some rocks, when dug from a considerable depth in the earth, in so soft a state as to be readily cut with a knife, become very hard on exposure to the atmosphere.

Carbonate of lime, conveyed in a state of solution among the loose particles of gravel, sand, clay, or mud, and there precipitated, becomes a very efficient agent of consolidation.

EXAMPLES.—1. On the shores of the Bermuda and West India Islands, extensive accumulations of broken shells, corals, and sand, are formed upon the shores by the waves; and these are subsequently consolidated, frequently into very hard rock, by the infiltration of the water which contains carbonate of lime in solution. The famous Guadaloupe rock, in which human skeletons, along with pottery, stone arrow heads, and wooden ornaments, are found, is of the same kind. 2. The Mediterranean delta of the Rhone is ascertained to be, in a good measure, solid rock, produced by the numerous springs that empty into it, that contain carbonate of lime in solution. The same is true of other rivers on the Mediterranean, especially on the east coast, where the ancient Sidon, formerly on the coast, is now two miles inland. 3. In Pownal, Vt., coarse gravel is cemented by carbonate of lime. 4. The fragments of marble accumulating at the quarries, are sometimes, in the lapse of a few years, cemented together as firmly as marble, by streams of water passing over them, saturated with carbonate of lime. An example is in West Stockbridge, Mass.

Another agent of consolidation is the red or peroxide of iron, or rather the carbonate of iron, since the peroxide is not soluble in water without carbonic acid.

EXAMPLES.—1. On the northern coast of Cornwall, England, large masses of drifted sand have been cemented by iron into rocks, solid enough some.