

hibited. A texture equally minute and complicated has been observed in the wood of large trunks of fossil trees found in the Craighleith quarry near Edinburgh, where the stone was not in the slightest degree siliceous, but consisted chiefly of carbonate of lime, with oxide of iron, alumina, and carbon. The parallel rows of vessels here seen are the rings of annual growth, but in one part they are imperfectly preserved, the wood having probably decayed before the mineralizing matter had penetrated to that portion of the tree.

Fig 60.



Texture of a tree from the coal strata, magnified. (Wittham.) Transverse section.

In attempting to explain the process of petrification in such cases, we may first assume that strata are very generally permeated by water charged with minute portions of calcareous, siliceous, and other earths in solution. In what manner they become so impregnated will be afterwards considered. If an organic substance is exposed in the open air to the action of the sun and rain, it will in time putrefy, or be dissolved into its component elements, which consist chiefly of oxygen, hydrogen, and carbon. These will readily be absorbed by the atmosphere or be washed away by rain, so that all vestiges of the dead animal or plant disappear. But if the same substances be submerged in water, they decompose more gradually; and if buried in earth, still more slowly, as in the familiar example of wooden piles or other buried timber. Now, if as fast as each particle is set free by putrefaction in a fluid or gaseous state, a particle equally minute of carbonate of lime, flint, or other mineral, is at hand and ready to be precipitated, we may imagine this inorganic matter to take the place just before left unoccupied by the organic molecule. In this manner a cast of the interior of certain vessels may first be taken, and afterwards the more solid walls of the same may decay and suffer a like transmutation. Yet when the whole is lapidified, it may not form one homogeneous mass of stone or metal. Some of the original ligneous, osseous, or other organic elements may remain mingled in certain parts, or the lapidifying substance itself may be differently colored at different times, or so crystallized as to reflect light differently, and thus the texture of the original body may be faithfully exhibited.

The student may perhaps ask whether, on chemical principles, we have any ground to expect that mineral matter will be thrown down precisely in those spots where organic decomposition is in progress? The following curious experiments may serve to illustrate this point. Professor Guppert of Breslau attempted recently to imitate the natural process of petrification. For this purpose he steeped a variety of animal and vegetable substances in waters, some holding siliceous, others calcareous, others metallic matter in solution. He found that in the period of a few weeks, or even days, the organic bodies thus immersed were mineralized to a certain extent. Thus, for example, thin vertical slices of deal, taken from the Scotch fir (*Pinus sylvestris*), were immersed in a moderately