of this kind are not common. Siliceous Diatoms and flint implements are among them.

In general, there is a change of some kind; usually, either a loss, by decomposition, of the less enduring part of the organic relic, with sometimes the forming of new products in the course of the decomposition, or an alteration, through chemical means, changing the texture of the fossil, or petrifying it, as in the turning of wood into stone.

The change may consist in a fading or blanching of the original colors; in a partial or complete loss of the decomposable animal portion of the bone or shell, a process that leaves shells and bones fragile. It may be a loss of part of the mineral ingredients by solvent waters, as of the phosphates and fluorides of a bone or shell; or a general alteration of the original organism, leaving behind only one or two ingredients of the whole; or a combining of the old elements into new compounds, as when a plant decays and changes to coal or one or more carbohydrogens, a resin to amber, animal matter to adipocere. It may be merely one of crystallization.

The change often consists in the reception of new mineral matter into the pores or cellules of the fossil, as when bones are penetrated by limestone or oxide of iron. Through this method bones may become as firm as when living, though also much heavier.

The change is frequently a true petrifaction, in which there is a substitution of new mineral material for the original; as when a shell, coral, or wood is changed to a siliceous fossil, through a process in which the organism was subjected to the action of waters containing silica in solution. In other cases, the organism becomes changed to calcium carbonate, as in much petrified wood; and in others, to oxide of iron, or to pyrite; and more rarely to fluor spar, barite, or apatite.

The mineral matter first fills the cells of the wood, and then takes the place of each particle as it decomposes and passes away, until finally the original material is all gone. Some fossil logs are carbonized at one end and silicified at the other.

The silica in most siliceous petrifactions has come from siliceous organisms, such as species of Sponges, or shells of Diatoms, from living species of the period that were associated with the fossil in the original deposit.

Examples of the Formation of Strata through the Agency of Life.

1. Deposits from Pelagic and Abyssal Life.

1. *Plants.* — Ordinary seaweeds, although in general littoral species, float widely over the ocean in some seas, as in the case of the Sargasso Sea of the north Atlantic. Moreover, the shore seaweeds are often drifted off by the currents. But the supply, while of importance as food for the animal species of the sea-bottom, makes no abyssal vegetable deposits. Dredging has brought up no remains of such deposits.

But Diatoms, which becloud the waters of the southern ocean, and there serve for the vegetable food of Whales, make the great deposits of Diatom ooze, as already described, besides giving a sprinkling of siliceous shells over all other parts of the ocean's bottom. These shells, as stated by Murray, are especially noticeable in the deeper Red ooze, because the carbonic acid, which removes calcareous relics, leaves them uninjured.