

and then—the walls or solid parts being removed by decay or solution—mineral matter, either similar to that filling the cavities, or differing in colour or composition, has been introduced. Silicified wood often occurs in this condition. In the case of silicified wood, it sometimes happens that the cavities of the fibers have been filled with silica, and the wood has been afterward removed by decay, leaving the casts of the tubular fibers as a loose filamentous substance. Some of the Tertiary coniferous woods of California are in this state, and look like asbestos, though they show the minute markings of the tissue under the microscope. In the case of silicified or agatized woods, it would seem that the production of carbon dioxide from the decaying wood has caused the deposition of silica in its place, from alkaline solutions of that substance, and thus the carbon has been replaced, atom by atom, by silicon, until the whole mass has been silicified, yet retaining perfectly its structure.

(c) The cavities left by fossils which have decayed may be filled with clay, sand, or other foreign matter, and this, becoming subsequently hardened into stone, may constitute a *cast* of the fossils. Trunks of trees, roots, &c., are often preserved in this way, appearing as stony casts, often with the outer bark of the plant forming a carbonaceous coating on their surfaces. In connection with this state may be mentioned that in which, the wood having decayed, an entire trunk has been flattened so as to appear merely as a compressed film of bark, yet retaining its markings; and that in which the whole of the vegetable matter having been removed, a mere impression of the form remains.

Fossils preserved in either of the modes, (a) or (b), usually show more or less of their minute structures under the microscope. These may be observed:—(1) By breaking off small splinters or flakes and examining them, either as opaque or as transparent objects. (2) By treating the material with acids, so as to dissolve out the mineral matters, or portions of them. This method is especially applicable to fossil woods mineralised with calcite or pyrite. (3) By grinding thin sections. These are first polished on one face on a coarse stone or emery hone, and then on a fine hone, then attached by the polished face to glass slips with a transparent cement or Canada balsam, and ground on the opposite face until they become so thin as to be translucent. In most cities there are lapidaries who prepare slices of this kind; but the amateur can readily acquire the art by a little practice, and the necessary appliances can be obtained through dealers in minerals or in microscopic materials. Very convenient cutting and polishing machines, some of them quite small and portable, are