(the metallic base of baryta), an alkaline earth and poisonous. These chemicals coming in contact with each other in liquid condition form an insoluble salt, and would no doubt preserve timber from ordinary decay if the capillary tubes could be filled with them. This process, as invented and used, calls for the same huge and much more expensive apparatus than the one before described, as the receiving cylinder is of copper. The chemicals are driven in in the same way, by pressure on all sides and ends. To be efficient the process must take much time, and be attended with difficulty and uncertainty in results, for it leaves all the residuum of the sap in the timber, which when dry may, and probably does, choke up some of the capillary tubes. The two chemicals have to be put in separately, as they react on each other quickly; so they cannot be mixed before the timber is impregnated. Then, if one chemical is forced in from both ends at one time, and made to fill all the capillary tubes, it is difficult to see how another ponderable liquid can find its way for any distance into the same stick of timber and by the same process. There is, however, reason to believe that this process, although tedious and expensive, does add value and endurance to timber.

Anyone taking up the preservation of timber as a subject for study and investigation, should, as far as possible, look into what others have done in former times. Evelyn, in his "Silva," written in 1644, gives much interesting matter on the life, growth, and properties of timber-trees; so did also the French writers, Duhamel and Buffon, in their papers on timber and its preservation, both writing about 1740.

The ancients had no doubt studied, and, in a measure, mastered this branch of economy, long before the thinking men of modern times first laid down the rudiments of our present systems of scientific investigation; for I have recently seen in Egypt, in the tomb of Tih, at Sakara, in the desert, among its wonders and unequalled skill in workmanship, some blocks of wood that must have been built into the corners of the walls at the ceiling at the time the structure was erected in the fifth dynasty, which, according to Mariette Bey, was over 3,500 years before Christ; these blocks of wood had circular holes in the under side to receive the upper pivot of the door-post, on which it turned; they were much shrunk and loose in the wall, but in a perfect state of preservation.

In the description of the tombs of the Emperors of China, it is shown that the stone ceilings are supported by columns of teak wood, that are said to be over three thousand years old. The wooden roof of Westminster Hall, built in 1395, of larch, chestnut, and oak, showed no signs of decay when I examined it in 1853; long may it last, for it is a most beautiful specimen of work, done five centuries ago.

I have a specimen of oak from Stirling Castle, said to be one thousand years old. I have also a specimen of nut wood—half wood, half charcoal—that once formed part of a window-sill of a house in Pompeii. I got it at the time it was uncovered, after being hidden from sight for eighteen hundred years. The Venetians were clever in the preservation of timber, as shown by the durability of their ships, and other structures of wood; the only system they had, fifteen hundred years ago, was to put the logs they wish to preserve in streams of running water, when fresh cut, and in doing this, they performed one of the most scientific and practically correct operations that has ever been performed by man in connection with the preservation of timber; and I have no doubt but that they understood the philosophic results to be obtained by what they did. A stick of timber laid longitudinally in running water, had, to a certain extent, a hydraulic head, a water-pressure against the upper ends of the capillary tubes, which were, the timber being green, full of the sap in its liquid state, and ready to run out of the lower end as soon as it had any inducement to do so, which inducement was the persuasive influence of water-pressure at the upper ends, in this case gentle and slow, but certain and efficacious; most of the seeds of decay, being in solution and in liquid form, are carried out and severed from the fibre of the wood; some atoms or integrant molecules have such a parasitical hold on to the fibre (it may be that they are in a state of transition from gluten to fibre) that they cannot all be severed—(It has been found, in making white gunpowder, that wood, reduced by machinery to the size of pin's heads, and then subjected to repeated washings with nitric acid, sulphuric acid, and water, cannot be reduced to pure carbon and volatile matter, the results aimed at)—but most of them are, and sent out of the lower end of the log, to vex it no more by attacks on its integrity, and threats of dissolution. A log prepared in this way, and without any chemical, is, undoubtedly, when dry, in a good condition to last a very long time; but it is far from perfect, it has in it still a large amount of vacant space, the capillary tubes are empty, and as soon as the water that drove the sap out has evaporated (dried out), the timber is in a very combustible condition; besides this, it begins to shrink and shrivel until its original dimensions are very much reduced, and, in that way, the symmetry and beauty of many things built of it are destroyed.

The great problems to solve are—

(1.) Can we prepare timber against decay (2.) Can we prepare timber so that it will not be inflammable? (3.) Can we prepare timber so that it will not lose much of its cubic dimensions by the effects of time? (4.) Can we prepare timber against the ravages of the teredo, the *Limnoria*, the white ant, and other timber-eating animals? (5.) Can we prepare timber so that it will not be dangerous to handle, and will not, when heated, send out noxious and poisonous vapours? I have great faith in covering all these points successfully

(1.) *As to Decay.*—I would answer, that by a thorough washing out of the capillary tubes of all organic matter that can be got out, and then filling them with inorganic matter in solution, we will render the timber safe against decay It will be answered, that any one chemical, any inorganic matter in solution, will go in, but it will be washed out again, or come out by changes of temperature through expansion and contraction. It will no doubt do so in time, according to locality and climate (just as sandstone lasts for ages in good condition in Egypt, and will not stand unaffected for half a century in London or New York; for in Egypt there are but few atoms of vapour of water flying about and getting in the rear of molecules of sandstone structures, and no "Jack Frost" to assist the vapour of water in its solid state to push the molecules from their position, when he takes command, as he often does, with a ruthless hand, in London and New York) I would propose to remedy this evil, of the first chemical coming out, by introducing into the pores of the timber a second chemical, one that will combine with the first, and form an insoluble salt; the water in such reactions becomes hydrated, the