cess of this kind is so simple, that there is no doubt it would have been made ages ago if our forefathers had seen the necessity of guarding against decay in the magnificent structures they raised; but it seems they must have possessed more skill, or exercised more care in the choice of their building materials than we are in the habit of doing, seeing that their edifices remain almost uninjured after the lapse of centuries, while ours begin crumbling to pieces before they are well finished.

With the discovery of the water-glass in recent times the name of M. Fuchs, of Munich, is associated; but his efforts to bring it into extensive use in England were almost ineffectual, though it probably gave the clue to the different modifications of the process now in use. Kuhlman, a French chemist, and others, took up the subject, and experiments were undertaken with the view of making the discovery available in protecting stone, wood, and even mortar used in sub-aqueous works, from decay. All the processes employed are based on the fact that common flint is soluble in a caustic alkaline solution, at a very high temperature, say of 300° Fahr., or thereabouts. This solution is as easily applied to a surface as though it were water; but when so applied, an exposure for a greater or less period,—but in no case a very long one,—renders it extremely hard. The new surface would be a hydrate of silica, and, as such, would be liable to the action of the alkaline carbonates contained in the atmosphere; but it is asserted by Kuhlman that when this solution is laid on stone there is a further decomposition, the result of which is to coat it with a silicate of lime, which is not susceptible of this action.

There is room for doubt whether this really does take place in Kuhlman's process; but, as regards Ransome's, there can be no doubt about it, inasmuch as it is obtained by applying two different solutions, the result of which is to produce silicate of lime by double decomposition. His method consists in applying the silicate of soda, prepared in the manner described above, to the stone, and then laying on a solution of chloride of calcium. The result is that silicate of lime is formed, which attaches itself to the stone as closely as silver does to a copper plate in electrotyping, and common salt, which is washed off. Theoretically, nothing could be more certain and perfect than this result; but the experiments tried with it at the House of Parliament seem to prove that in practice it is not altogether so free from defects as it ought to be. The reason of these partial failures, however, we ascribe rather to the conditions under which the experiments were made. At the lectures delivered at the Royal Institution, specimens of stone operated upon by this process were exhibited by Professor Ansted, which were all that could be desired.

Szerelmey's process is so far a secret that it has never been described by the inventor; but, from what has been ascertained, it seems that it differs from Kuhlman's only in the subsequent application of a bituminous solution, or, at any rate, in the addition of bitumen at some stage of the process. Whether this is merely to protect the stone from the atmosphere while the silicate of lime is in course of formation, or whether it enters into the composition of the preservative solution and becomes a constituent part of it, we are, as yet, unable to say. Flint itself, it is said, contains a small portion of bituminous matter, to which it owes its colour, and, therefore there would be no difficulty in adding a little more, if such a course were found advisable. Whatever preservative process may ultimately be preferred, this is accepted as the best at present, but time alone can determine whether it really is so or not. In the letter written by "An Architect," it is stated that the composition applied by M. Szerelmey to the walls of one of the courts at Westminster during the summer is still soft, and can be scratched of with the nail; but we do not think that this is of much importance, unless it be shown that in consequence of this softness the surface beneath continues to decay.

The reason of the partial failure in those cases where the solution has been applied, arises, we conceive, from the condition of the stone at the moment of its application. The surface was frequently rotten; and, where that was not the case, there was, in all probability, so great a quantity of moisture present in the stone that the chemical action was checked, or together prevented. It has been suggested that there was another cause of its flaking off, arising from what has been termed "nitrification"—in other words, the formation of crystals of nitrates, which is frequently observed in stone surfaces, and on the plaster which coats the walls of damp rooms. Whatever may have been the cause, there is no denying the fact that the attempts to cover the stones of the Houses of Parliament with a siliceous varnish, as Colonel Rawlinson terms it, have been almost ineffectual, chiefly, we believe, from the conditions under which it was applied, and the remedy for which we propose to develope.

It will be seen that the difference, if difference there be, between the processes described is so very trifling that the results in either case would be pretty nearly equal. The objection to Kuhlman's, that, in consequence of the slowness of the decomposition of the ingredients of which it consists, it is unfit for use in a climate so changeable as ours, where a shower of rain would probably intervene before the process was completed, and wash off the solution, is as applicable in a minor degree to all the others. But we submit that there is not the slightest necessity for incurring this risk in future. Instead of applying the solution to the building, let it be applied to the stones while in the stonemason's yard. This is a point which we have not seen mentioned in anything we have read on ths subject. We cannot conceive what difficulty there could be in cutting the stones and then leaving them under shelter, but exposed to a current of air to evaporate the moisture out of them. In this way they would become dry, and, as they dried, they would harden. The pores of the stone being thus freed from moisture, they would absorb the preservative solution into them just as a sponge sucks up water, by capillary attraction; so that it would not be merely a surface protection, which might be gradually destroyed by the mechanical action of the rain driven against it by a high wind, but a solid mass of material, alike unassailable by the chemical action of gases in the atmosphere, or by the mechanical attrition of the particles of dust and rain. This need involve no additional cost for materials, and its adoption would not only obviate the objection to the employment of soft stones, but, as we believe, actually render them preferable, as being even more imperishable than the finest marble; and in the case of magnesian limestone imperfectly crystalised, which, under ordinary circumstances, crumbles to powder, would entirely prevent this decay from being of material consequence by indurating the stone to so considerable a depth.