with the wood, is not a supersaturated oxyde, but the por­tion of oxygen it has absorbed is held in strong combina­tion ; and, consequently, instead of the process of oxidation continuing from lamina to lamina, as has been described to be the case in iron, the surface oxidation becomes a natural protection of the copper from the action of the wood, and of the wood from the action of the copper, equivalent to the resinous or oily coating which supervenes in the case of iron driven into teak.

With this view of the process of decomposition in timber, we have an insight into the *rationale* of the various means proposed for its preservation. Several writers on timber have more or less urged the foregoing principle. Macko- nochie, in his Prospectus, has adopted this theory ; and though his reasoning on the causes of decomposition is not given with his usual perspicuity, his deductions as to the means of prevention are perfectly free from this objection. He recommends, that whatever iron is used for fastening, a protecting coat of paint or some other substance should be interposed between the iron and the wood, to cut off, as far as possible, the connection between the metal and the woody fibre.

He also recommends that, in seasoning timber, care should be taken to expose it to the light, which will have great in­fluence in making it give out its oxygen. But as it must re-absorb oxygen in the night, and will at least be supplied with it from the atmosphere, the only effectual means is at once to expel it, and fill up its space with some other substance ; for which purpose, he says, “ oil presents itself as the fittest, its use in defending timber from the action of the weather having been long acknowledged and practised.” He recommends the following process as an easy means of impregnating the timber with this or any other similar sub­stance. The wood is to be placed in a steam-tight cham­ber, and subjected to the action of steam, by which the air and gases will be expelled both from the chamber and the timber. Then, by condensing the steam, and repeating the process until the whole of the elastic fluids are withdrawn from the wood, and the non-elastic converted into vapour, the wood becomes freed from them, and if plunged into oil, and subjected to the atmospheric pressure, the whole interior of the wood will be filled with the oil. Macko- nochie asserts that he then has (6th August 1803) in daily use a steam-chamber on the above principle, capable of con­taining from twenty to thirty planks forty feet long, or a proportionate quantity of timber, in which, while the planks are steaming to render them flexible, they are impregnated with teak oil. He says the oil may easily be procured from the chips and saw-dust used for the fuel of the steam-boil­ers ; for it has been ascertained that Malahar teak contains such a quantity of oleaginous or terebinthinous matter, that the chips from the timber and plank of a ship built of it will yield, by a proper process, a sufficient quantity of tar for all its own purposes, including the rigging ; and that although oak-timber does not contain so much of these substances, the chips of the fir consumed in the royal navy would be more than sufficient to supply tar to saturate the oak.

There have been numerous proposals to impregnate tim­ber, in a greater or less degree, with foreign substances. In 1779 a proposal was made by a M. Pallas to mineralize timber by steeping it to saturation in a solution of green vitriol, and then precipitating the green vitriol by means of lime-water. A gentleman of the name of Bill, about the year 1822, produced some samples of timber of large scant­ling, impregnated throughout their substance, apparently, with asphaltum. The samples thus prepared were subjected to a trial of five years’ duration in the dry-rot pit at Wool­wich ; and we have it on the authority of Mr Knowles, the able secretary to the late committee of surveyors of the navy, that they perfectly withstood the “ fungus rot,” while numerous unprepared specimens were destroyed in one fifth

of the above time. Sir John Barrow, whose long expe­rience and acknowledged talent render his opinions on all naval matters extremely valuable, recommends the kreosote from the distillation of tar, which, in the shape of a gas, will, he says, penetrate every part of the largest logs, “ and render the wood almost as hard as iron, so hard as not easily to be worked.” Another plan, that proposed by Mr Kyan, is to soak timber in a solution of corrosive sublimate. This, on the principle advocated in this article, would be effec­tive in all cases where the saturation was complete and per­manent. Where the application is only of the nature of a surface application, there does not appear to be any reason why the corrosive sublimate should preserve the interior of the timber, or have more effect on that part than any other surface applications, excepting that it would more certainly destroy any vegetative principle which might exist in that portion near the surface to which it could penetrate.

The rationale of Mr Kyan’s process may be best under­stood by the following quotation from a lecture by Dr Birkbeck. “ Aware of the established affinity of corro­sive sublimate for this material (albumen), he applied that substance to solutions of vegetable matter, both acetous and saccharine, on which he was then operating, and in which albumen was a constituent, with a view to preserve them in a quiescent and incorruptible state ; and obtaining a confirmation of his opinions by the fact, that during a pe­riod of three years, the acetous solution openly exposed to atmospheric air had not become putrid, nor had the sac­charine decoction yielded to the vinous or acetous stages of fermentation, but were in a high state of preserva­tion, he concluded that corrosive sublimate, by combina­tion with albumen, was a protection against the natural changes of vegetable matter....He conceived, therefore, if albumen made a part of wood, the latter would be protect­ed by converting that albumen into a compound of pro­tochloride of mercury and albumen ; and he proceeded to immerse pieces of wood in this solution, and obtained the same result as that which he had ascertained with regard to the vegetable decoctions.” The writer of this article has seen most conclusive experiments as to the beneficial effect of “ Kyanization,” especially on the softer woods.

Innumerable nostrums have been recommended as sur­face applications for preventing the decay of timber. Knowles, in his work on the Preservation of the Navy, gives a list of twenty-nine, besides many others the com­ponents of which were kept secret by their projectors. There does not appear to he sufficient evidence to prove the decided advantage of any of these applications ; on the contrary, unless the timber to which they are applied should be thoroughly seasoned, all coatings on it which prevent the progress of the seasoning process, and confine the vegetable juices, have been proved to be injurious. If timber be already well seasoned, the principal preventives to decay appear to be ventilation and the exclusion of damp ; and with unseasoned timber the same means will accelerate the process of seasoning. Those means of preventing de­cay by saturation with some chemical agent, and thus al­tering the nature of the timber by a chemical action on its constituents, appear to be the most likely to produce de­cided results. The physician-general of the navy, Sir Wil­liam Burnett, finding that the precipitate caused by the kyanization was soluble in salt water, has lately substituted for that process saturation with the chloride of zinc ; the precipitate which this forms with the albumen being un­affected by the action of the salt water. The beneficial effect of this chloride is very decided, in those specimens which the writer has had an opportunity of examining.

There has been much controversy as to the proper season for felling timber, into which we cannot devote space to enter. The argument appears to be in favour of the greater durability of winter-felled timber. In fact, the controversy