LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The failure of foreign trees on American soil.

ALLOW me to enter a respectful protest against the sweeping judgment of Professor Sargent in condemnation of foreign trees, which you publish approvingly in your issue of March 4. Though there is, no doubt, a great difference between the climate of this continent and that of Europe, and though unquestionably tree-growth is most dependent upon climatic conditions, yet it would be unwarrantable, from its failure in one place or even several places in this country in ornamental plantations, to generalize upon the adaptability of an exotic species for *forestry* use. It seems to be generally overlooked, if not unknown, in this country, that forestry and arboriculture, or tree-planting as practised by the horticulturist or landscape-gardener, are not the same thing, but in their objects, and consequently in their methods and results, are entirely different. While in ornamental planting the individual tree is the object, and its form in its unity and the development of its beauty is the aim of the planter, forestry has to do with an aggregate of trees, which, properly placed and grouped together, grow and develop very differently from the single tree, or even group of trees, on the lawn. The European larch, even in its native country, does not make a desirable lawn-tree in every locality, and, coming originally from the highest mountain elevations, even as a forest-tree, it requires, when grown upon the plain, particular conditions and special management to secure a thrifty growth, and the quality and quantity of timber for which the tree is noted. I have often pitied those in this country who have expected these results without paying attention to the requirements of the tree. As to the Norway spruce, of which Professor Sargent speaks so disparagingly, I have not seen a finer ornamental conifer of its kind on this side of the Atlantic; and though, as is the case with all the conifers, a time arrives when it loses its peculiar beauty, I doubt whether it does so sooner than any others, while, as a forest-tree, it needs only proper conditions and management, I venture to say, in order to attain the size and quality which it shows in its native country. Plant the Norway spruce in dense groves, on a northern or north-western exposure, with the European larch sparingly interspersed, and no planter will live long enough to see these two, thus united, fail in their onward development.

The Scotch-pine, on poor but deep sands on the western prairies, I am sure will make useful timber sooner than the white-pine. The white-pine was introduced into Germany on large areas about ninety years ago. Growing with great rapidity, and yielding astonishing quantities of wood per acre, the quality of the wood was found to be very inferior until recent years. Experiments have lately shown that the white-pine requires ninety years to make wood of as good quality as the Scotch-pine will produce in seventy years under similar conditions, just as different grains will require different lengths of season in which to mature. These experiments and the many similar ones which could be cited should teach us to be chary of generalizations upon our scanty experiences in forestry in this country.

Of the European willows, so far as osier-growing is concerned, only one, Salix purpurea, seems to have been found adapted to our climate, while several native ones promise success if properly treated.

While I am a most earnest advocate of seeking for the best in that which we have ourselves, and while I advise the planting first of our native trees, with a special study of their requirements, I must deprecate any know-nothing movement against the good things which we may import. Especially let us remember that New England constitutes, territorially and climatically, but a very small part of our country, and that conclusions drawn from experiments there may not be applicable to other portions of it.

B. E. FERNOW.

Washington, March 7.

Inertia-force.

I had thought that my pamphlet, 'Elementary ideas,' etc., might awaken discussion, and possibly bring about a better understanding among teachers of physics as to the interpretation of certain familiar terms. The discussion has evidently begun. Let us not despair of the better understanding.

Having made, however, one direct attempt to explain to Professor MacGregor my use of the term 'inertia-force,' with the sorry result of disgusting him by the use of "language which is not the current language of dynamics," I shall for the moment adopt a different course, and find a little fault with his way of stating things.

Professor MacGregor accepts fully the doctrine stated by Maxwell in a passage quoted in my first letter, that "all force is of the nature of stress, that stress exists only between two portions of matter," and that "the stress is measured numerically by the force exerted on either of the two portions of matter." I will undertake to show wherein his reasoning seems to me to be inconsistent with this doctrine. He takes my illustration of a railway-train which is being set in motion by a locomotive, and says, "If F is the pull of the locomotive, R the frictional resistance, M the mass of the train, and a its acceleration, we have undoubtedly, by Newton's second law of motion,

$$a = (F - R) \div M.$$"

To this every one will agree. Now, with Professor MacGregor's permission, I will put this equation in the form

$$F = R + aM.$$

F is, by his own statement, a force, — the force exerted *by* the locomotive *on* the train. By the doctrine stated by Maxwell, which Professor MacGregor accepts, the force exerted *by* the train *on* the locomotive is also equal to F. It is therefore equal to, and may be expressed by, the terms $R + aM$. Now, one part of this force, the part R, is accounted for by the resistance of friction transmitted through the train to the coupling of the locomotive. How shall we account for the other part of the whole force exerted by the train on the locomotive, the part aM? I call it the *inertia-force*, — the force, or resistance, which the train, *by virtue of its inertia*, exerts on the locomotive which is setting it in motion. I think I can be persuaded to drop the term 'inertia-force,' if a more accurately descriptive one can be adopted; but Professor MacGregor, if I understand him, does not object to the term merely. He denies that the train offers any resistance by virtue of its inertia. But in