2. The division of our natural science chair into two, or the appointment of an assistant professor.

3. The endowment of a chair of civil engineering and surveying.

4. Professors, lecturers, or tutors in mining, assaying and metallurgy, practical chemistry, agriculture, and agricultural chemistry, and mechanical drawing.—Some of these departments might be taken up by persons otherwise employed, and not depending for their whole support on the University.

5. Some improvement of, and additions to, our present apparatus, and the addition of collections of models, machines, and objects relating to the arts.

This might involve an additional annual expenditure of say $8,000, a very trifling sum in comparison with the cost of similar institutions elsewhere. With this, and the fees of students, we might here establish an efficient School of Practical Science and Technology for the Dominion of Canada, which would at once raise the character and reputation of this city throughout the world, and confer incalculable benefits on education and the arts of life. Such an Institute is wanted to crown the educational fabric reared here by the liberality of Montreal merchants, with its success and the full measure of its utility. I would go further than this, and hold forth the hope of the full realization of the object in view, if an annual revenue of even half the sum above mentioned could be secured at once by private endowment. We could begin on an economical scale, and with the more important subjects only, and could, surely, with some reason expect the Government of the country to supplement such a private endowment with a like sum.

It may be asked, would students be forthcoming? I may with confidence answer the question in the affirmative. From the applications made to me on the part of young men for whom I can do little or nothing, I believe that one central well-appointed technical university in this Dominion, would be well sustained, in so far as the number of students is concerned; and that the extension of population, of mines, manufactures, railroads, and other works, would afford an ample outlet for all the men it could train, while the professional work of such men would itself tend to increase the demand.

It is certain, however, that if the Government of this country could be induced to sustain a system of elementary technical schools similar to those of the Department of Science and Art in England, or similar to those of Prussia, a double benefit would be secured, in so far as the higher science education is concerned, in finding occupation as teachers of science for some of the graduates, and in giving the necessary preliminary training to students. At the same time the effects of such schools would be of incalculable importance to the working classes of this country. Local benefactors might do something for such schools; but for a proper system the Legislature must intervene, and it can secure the end only by payment for results on the English system, under proper arrangements for examination and inspection.

CONCLUSION.

In conclusion, I may remind some of my audience and inform others, that the views advanced in this lecture, and which are now sweeping on in a resistless tide in every civilized country, are not new with me. When, in 1855, I entered with much diffidence on the arduous and then not very hopeful office which I now have the honour to occupy, I held views on this subject as advanced as those which I hold now, and saw quite as clearly as at this moment, the improvement and extension of science education to be the greatest educational movement of our time. I had then studied the Reports of the University Commissioners in England, and had read the admirable exposure of the evils of the existing systems made by Sir Charles Lyell. I was familiar with the details of the Prussian system. I had recently been engaged, with several leading educationists, under the presidency of Sir Edmund Head, in the organization of a scheme for the reform of the University of New Brunswick. I had just returned from conferences with leading educational and scientific men in England and the United States. I was strongly impressed with the necessity of science education in this country, zealous for its introduction here, and hopeful that, if any kind of education would commend itself to the sense of progressive, commercial community, this would.

Confessing in my inaugural address that I came among you "in the hope of promoting the study of the subjects to which I had devoted myself, and at the same time advancing the cause of education," I maintained that the spirit now abroad with regard to University reform "had for its object to make the carefully elaborated learning of all the great academical centres become more fully than it has yet been the principal moving power in the progress of practical science, of useful art and of popular education," and I specially indicated the institution of schools of civil and mining engineering and of scientific agriculture, as enterprises which should be at once entered upon.

When I look back on the hopes and struggles of those earlier years, though I entertain a feeling of profound thankfulness to God for the measure of success and prosperity which has attended this University, and though I am most grateful to its many benefactors, I cannot forget the disappointment of my own hopes. Much has been done for general education, and McGill College has grown to be a comparatively great and prosperous institution. But all that I have done toward this any one could have done. The one thing that I could have done, for which I was willing to sacrifice all that I would have gained as an original worker in Geology, and which would have been of more real importance, not only to Montreal, but to all this great country from Red River to Newfoundland, than all the rest, has not been done. I confess I often almost sink under the despairing feeling that it will not be done while I live; and that I may never have the opportunity of doing for this community the only great service that I believe myself competent to confer upon it.

Yet I know that much good preliminary work has been done, that material has been accumulated and tastes for science created; and I am reluctant to abandon the hope that I may yet see in Montreal a thoroughly equipped Institution, in which any young man, with the requisite ability and preliminary education, may learn the scientific facts and principles, and receive the training in scientific methods, necessary to qualify him for mining, metallurgy, assaying and engineering, agriculture, chemical manufactures, or other applications of science to art. Until this can be realized, I shall feel that the work of my life has been only very partially and imperfectly successful; and I shall know that this city has not taken the means to prepare itself fully for that greatness which its position and advantages mark out for it, but which it cannot attain, except as the educated metropolis of a country—educated not merely in general learning and literature, but in that science which is power, because it wields the might of those forces which are the material expressions of the power of the Almighty Worker.

MISCELLANY.

Science.

— *Standard Measures.*—One of the most important standard measures is that for distances or measures of length. A practical want has always been felt of some fixed and invariable standard, by means of which all distances might be compared, and such fixed standard has been sought in nature. There are two natural laws, either of which afford this desired natural element. Upon one of them the English and Americans have founded their system of measures, and upon the other the French have based their system.

First. The English and American system is based on the law of nature that the force of gravity is constant at the same point of the earth's surface, and consequently that the length of a pendulum which oscillates a certain number of times in a given period is also constant. It is accordingly decreed by English law that the 1-3.26159th part of the length of a simple pendulum, beating seconds at the Tower of London, shall be regarded as a standard English foot: and from this, by multiplication and division, the entire system of linear measures is established.

Second. The French system of measures is founded upon the principle of the invariability of the length of an arc of the same meridian between two fixed points. By a very minute survey of the length of an arc of the meridian from Dunkirk to Barcelona, the length of a quadrant of the meridian was computed, and it has been decreed by French law that the ten millionth part of this length shall be regarded as a standard French metre; and from this, by multiplication and division, the entire system of French linear measures has been established.

On comparing two accurate scales, Captain Kater found that the French metre was equal to 3.280899 English feet, or 39.37079 English inches. This relation enables us to convert all measures in either system into the corresponding measures of the other system.

The standard of linear measures having been established on natural and invariable laws, the standard measures of weight have been in turn