

they do not detract from or interfere with the great general Universities of Germany, in which scholarship and philosophy have reached to high a pitch of development.

A recent English writer thus eulogizes the Prussian system:—
 "The Prussians, whatever their other qualities, are emphatically a scientific people, and to that predominating characteristic first and foremost are their recent military triumphs due. We do not mean that because they are great chemists, astronomers, and physicists, therefore are they necessarily great soldiers: so narrow a proposition would hardly be tenable. What we mean is that the spirit of science possesses the entire nation, and shows itself, not only by the encouragement given throughout Germany to physical research, but above all by the scientific method conspicuous in all their arrangements. What does the word Science, used in its wider sense, imply? Simply the employment of means adequate to the attainment of a desired end. Whether that end be the constitution of a government, the organization of an army or navy, the spread of learning, or the repression of crime, if the means adopted have attained the object, then science has been at work. The method is the same, to whatever purpose applied. The same method is necessary to raise, organize, and equip a battalion, as to perform a chemical experiment. It is this great truth that the Germans, above all other nations, if not alone amongst nations, have thoroughly realized and applied. In all the vast combinations and enterprises with which they have astounded the world, no one has been able to point to a single deficiency in any one essential element. Every post has been adequately filled and every want provided for; from the monarch, the statesman, and the strategist, to the lowest grade in the army. This is the method of science, literally the same method which teaches the chemist to prepare his retort, his furnace, and his re-agents, before commencing his experiment."

WANT OF SCIENCE TEACHING IN CANADA.

Let us now turn to our own country, and study its means and appliances for the pursuit of practical science. The task is an easy one, for with the exception of two or three small and poorly supported agricultural schools, this Dominion does not possess a school of practical science. With mining resources second to those of no country in the world, we have not a school where a young Canadian can thoroughly learn mining or metallurgy; and, as a consequence, our mines are undeveloped or go to waste under ruinous and unskilful experiments. With immense public works, and constant surveys of new territories, we have not a school fitted to train a competent civil engineer or surveyor. Attempting a great variety of manufactures, we have not schools wherein young men and young women can learn mechanical engineering, practical chemistry, or the art of design, or we are very feebly beginning such schools. We have scarcely begun to train scientific agriculturists or agricultural analysts. Our means for giving the necessary education to original scientific workers in any department, or of training teachers of science are very defective. Hitherto we have been obliged to limit ourselves to the provision of general academical courses of study, and of the schools necessary for training men in medicine, law and theology. Other avenues of higher professional life are, to a great extent, shut against our young men, while we are importing from abroad the second-rate men of other countries to do work which our own men, if trained here, could do better. Let us enquire then what we are doing in aid of science education, more especially in this commercial and manufacturing metropolis of Canada, which we may surely venture to regard as at least a Canadian Manchester, and something more important than a Canadian Zurich.

WHAT IS BEING DONE IN MONTREAL.

(1) We have at least advanced so far as to regard physical science as a necessary part of a liberal education. In this University some part of natural or physical science is studied in each year of the College course, and we provide for honour studies in these subjects, which are at least sufficient to enable any one who has faithfully pursued them to enter on original research in some department of the natural productions and resources of the country, and to receive some considerable portion of the training which such studies can give. We have provided in our apparatus, museum, and observatory, the means of obtaining a practical acquaintance with several important departments of science. But in a general academical course of study too many other subjects require attention to allow science to take a leading place; and it is not the proper course of educational reform to endeavour to intrude science in the place of other subjects at least quite as necessary for general culture. We require to add to our general course of instruction special courses of practical science, presided over by their proper professors, and attended by their own technical students

(2) The lower departments of science education are to some small extent provided for by the teaching of elementary science in the schools. This, imperfect though it is, is of value, and I attribute to the partial awakening of the thirst for scientific knowledge by the small amount of science teaching in the ordinary schools in the United States and in this country, much of that quickness of apprehension and ready adaptation to new conditions, and inventive ingenuity which we find in the more educated portions of the common people. The Provincial Board of Arts and Manufactures also deserves credit for the attempts which it has made, under many discouragements, to provide science and art classes for the children of artisans. Proposals are also before the Local Legislature for Schools of Agriculture. The Local Government has procured reports on this subject from the Principals of the Normal Schools, and has also sent a special agent to study and report on the Agricultural Schools of France, Belgium and Ireland, which are well worthy of imitation. A still more important suggestion has been made to the Dominion Government by the Director of the Geological Survey for the erection of a School of Mining.

These arrangements and proposals are valuable as far as they extend; but they fall short of providing the full measure of the higher education, whether with reference to the training of original investigators, or of the various kinds of professional men required for the development of the resources of the country. Let us enquire how this wider and higher science culture can be secured.

SUGGESTIONS FOR HIGHER SCIENCE TEACHING.

The higher technical and science education may be provided for in either of the following ways. (1) We may have special schools of mining, engineering, &c., each pursuing its own course, and not connected with any general institution. The objections to this are, that it is not economical, that it cannot provide the necessary literary and general training, that the pupils of such schools are very likely to be of various degrees of excellence and very partially trained. Such objections are applicable to schools like the Royal School of Mines in London, and I think they would prove fatal to the influence of such schools in this country. (2.) We might imitate the German technical universities. This would be the most thorough course possible; and were the means forthcoming, I cannot conceive of any greater educational benefit to this country than the institution of such a University. But it may be long before we shall find in our Legislatures, general and local, the wisdom and patriotism which actuated those of Switzerland in establishing the Zurich School; and we may have to wait quite as long for the appearance of a Canadian Cornell to give and to stimulate legislative liberality by his giving. (3.) The last, and, it appears to me, the only practicable course at present, is to ask for endowments similar to those of Lawrence and Sheffield, and thus to establish special courses of Science in connection with academical institutions, on the plan so well carried out in Owen's College, Manchester, and in the Sheffield School of Yale. This has proved the most successful course in the United States and in the Mother Country, and I have no doubt will prove so here. It is to be observed in this connection that I would not propose merely the institution of a Science degree. We have in this University the means to do this now, but I doubt its expediency, more especially as our honour course in Mathematical and Natural Science is equivalent to that for such a degree and something more, and can be as readily and easily pursued. Nor would I follow the advice above referred to as given by the Principal of Edinburgh University and the Chairman of the Endowed Schools Commission, to curtail the classical part of the ordinary course in favor of science studies. Such an arrangement would, I have little doubt, injure the literary part of the academical course more than it would benefit science. I would prefer a regular and definite science school, with a course extending over three or four years—the first year to be identical with or similar to that of the ordinary course, or an equivalent examination to be exacted, at least, in modern literature and science; and the remaining years to be occupied with mathematical, physical and natural science, and modern languages, branching in the closing two years into special studies leading to particular scientific professions. The staff and appliances of such an institution would depend on the extent of its range; and this, to ensure success, should not be small.

In this University large provision has been made in apparatus, collections and teaching power, for the foundation of a good science school; but to enable us to undertake the task effectually would require, in addition to our present means:

1. The separation of our mathematical and physical chairs, or the employment of an assistant professor.