trace the relationship between our modern complicated code and the simple enactments of the early village commune. The history of the migrations of races is read in the words they have dropped by the way. On every hand this spirit of enquiry is abroad; there is no profession, there is scarcely a pursuit that is not affected by it. While thus widespread and far-reaching it is a phenomenon almost entirely confined to our own times. But though new it is powerful, and that country or that institution would seem to be acting wisely which, taking advantage of this tendency by preparing for it, sends out men skilled and strong to work along these lines. It is a trite saying that no one is by nature master of any subject. A boy may have a turn for the use of tools, but it requires a mechanic's training to use those tools to the best advantage. Probably every reasonably sane man is naturally an investigator of something, but his success is likely to depend quite as much on right methods as on ability. If adding to the sum of human knowledge be praiseworthy, then the institution which causes the largest addition to be made surely deserves most credit; and it seems a very evident truth that the men of largest training, widest experience and most varied knowledge are the ones most likely to increase this desirable sum. The only ground for difference of opinion here is as to what constitutes this better equipment. But as we are concerned only with Science students there does not seem to be much room for dispute.

5. A further consideration which must count in this matter will be whether the circumstances of the times and of the country are such as to warrant the alteration in the manner here proposed.

I spoke a few moments ago about the tendency of modern education to depart from the course so long followed in the past. All along the line there has been advancement in the direction of independent investigation, but out of that very advancement has come another development which must not be omitted here:—the tendency to specialization. The outcome of this must be that if a man is to devote his life to mastering one subject, or one division of a subject, there must be many men required to cover the entire field of scientific research. Let me instance: De Candolle, the elder, probably knew the entire range of Botany of his day. Now, one man is a recognized authority on classification, another on Vegetable Physiology, a third on plant life as related to climate, a fourth investigates fungi, a fifth devotes his work to those questionable species lying on the borderland between the animal and the vegetable, a sixth studies fossil specimens and reconstructs the vegetable worlds of the geologic ages, a seventh spends his time finding out about conditions of life and food, and another still is busy with organic variation and development. Thus it requires a dozen or more men, each intent on his own specialty, to work over the field which one man covered two generations since. The explanation is that the field has not only increased in extent, but is being worked with vastly greater minuteness, which means thoroughness. Think of the Chemistry of Davy and the Physics of Faraday and Rumford, then compare these seedlings with the giant growths which they have become in a few years, and one well understands why men to-day must be specialists, and be very narrow in their applications too, in order to ever accomplish anything. The query is, To what extent should a University adapt its courses to this particular outcome of our times?

6. A further consideration and one upon which I think very great stress should be laid is that arising from the probable requirements of the country for well-trained scientific men. I spoke a little time ago about our newest civilization; by that I meant all those phenomena arising from the improved means of intercourse among the peoples whom we call civilized, and the branches with which we are chiefly concerned here are those relating to manufactures, natural products and interchange of these among the various nations. The economic conditions under which much of the world's material progress goes on are such as to demand the very best return for the outlay; and in order to get that best return it is daily becoming more and more necessary to consult the specialist and to act on his suggestions.

Men who have not looked into this matter do not know how absolutely dependent all the world's progress is on the trained expert. Look at what a century of steam has produced and the enormous demands thereby made in technical knowledge and skill. Think of the problems set for solution by such objects as the building of a transcontinental railway or a fast ocean steamer, the working of a deep lead mine, looking after the sanitary condition of a great city, or obtaining the food supply of a large district without permanent impoverishment of the soil. Not only on the mechanical side, but even in the regions of pure Science, there are surely enough difficulties to be mastered to demand the best skill that can be supplied—and not alone best in quality, but great in quantity. I may be pardoned here for quoting some words from the opening address of Dr. Stanley Hall, the President of the new Clark University, an institution, as you probably all know, designed to give the best possible training in actual scientific work. Dr. Hall says: "A good illustration of the high and normal technological value of pure Science is at hand in dyeing, one of the most scientific among the many and increasing chemical industries. England furnishes most of the raw material for coal-tar colors, out of which Germany made most of the $17,500,000 worth manufactured in 1880. England bought back most of the colored goods and Germany made the profits, because she could furnish the best training in pure Chemistry. The great factories there employ from two or three to more than a score each of good, and often the best University-trained chemists at large salaries, and the best of these spend a good part of their time in original research in the factory laboratories. The German government has met this demand by erecting and equipping new and sometimes magnificent laboratories at nearly all of her Universities."

Now, with slight change, what is here stated of German factories must in a measure apply to Canadian industries Perhaps our manufactories will not employ very many such men for some time to come, but the country will need them. We have immense deposits of iron rendered useless by intermixture of foreign matter, such as phosphorus and titanic acid. Who is to find a means of making this ore workable? There is a fortune awaiting the man who will find a cheap and efficient method of reducing our phosphates so that they will be useful at a moderate price. To whom are we to look for a practical solution of the problems connected with the gas and oil deposits of the Western peninsula; the, at present, unprofitable and unworked gold mines of the East, the peculiar mineral veins of the North snow region, and a dozen other such things? In every case the answer must be the skilled mineralogist and geologist. This is in only one branch. Agriculture in Canada will require very careful attention soon; our forests want looking after, the geology of the Dominion has to be investigated, the fauna and the flora worked out, and every one of these should have a corps of of skilled and trained men.

But there are other sides to the question still. Professions and pursuits have come to be very interdependent. As an example, we all know how the study of medicine has changed of late years, and what a prominent part Biology plays in the medical theories of to-day. This profession has long been dependent on Chemistry, but now a good working knowledge of Physics and Biology are equally essential, and I do not think it out of the way to say that in the near future he who will aspire to any high position in the medical profession must, at the same time, be thoroughly versed in the sciences mentioned.

All this but leads to the conclusion that in a great measure the future prosperity of the country will be dependent on the men specially educated for the works requiring their attention. It is said in commercial circles that the Germans as a nation are in a great measure out-doing all others in the competition for the world's manufacturing market, and the reason generally assigned is cheapness of labor there. I think the reason is not correct. There is manifestly something beyond, and something far more powerful than the mere cheapness of labor. The answer as to what that something is I think is largely in the quotation I have given from Dr. Hall's address—"Employment of the most skilful technologists in the factories, and intelligently turning to account the practical results of their investigations." To this point every country attempting to support manufactures on any large scale must come or else give up the fight.

To sum up now the conclusions at which I arrive are these: The present condition of scientific study in the University and in the High schools is such that a step in advance in the University work may very well be taken.

If it be thought wise to make this advance the High schools and Collegiate Institutes are in a position to do the required preparatory work.

The great development of the Science department lately, and especially the advance in the Natural Science section would well warrant any reasonable increase of the work there done.

The whole tendency of modern education is in the direction of scientific work, and that would authorize the University in undertaking the best work that it is capable of doing in this department.

The demand for thoroughly skilled scientific men is constantly increasing throughout the civilized world, both in connection with material progress and with other professions, and in Canada that demand is likely to be continually greater.

These conclusions, if correct, would all seem to require a more extensive scientific training, and I do not think it would be unreasonable, in view of what I have before said, to lay out an Honor Course in Science, in which the student would get a preliminary training in Science, Moderns and Drawing (for Honor work I would invariably make these last two accompany the first) in the High schools, and then continue that Course, allowing options throughout the four years.

❋ Correspondence. ❋

HARDSHIPS OF THE COUNTRY TEACHER.

To the Editor of the EDUCATIONAL JOURNAL.

SIR,—Will you kindly allow me a little of your valuable space, in which to air the grievances of myself, and, I rather think, many more country teachers?

First, that text-book on Canadian History. How long are we to be restricted to a text-book which needs translation before the children can understand it?

It may be answered, we are not restricted to the text-book, but *are expected* to refer to other works such as Parkman's "Pioneers of France in the New World," Withrow's, Archer's and Christie's histories of Canada and others. Just here, however, a difficulty arises. We, in the country, have not public libraries at our command, and do not possess the books and cannot afford to buy them. Then if we had them and made full use of them, this is only a small part of our difficulty. History isn't the only subject in which we need books of reference. Then, if we teach thoroughly and fully the different subjects, it would take about twelve hours a day in the school-room instead of six. And to prepare for each day's work would take three hours at the very least. That sounds like exaggeration, but I do not think it is. We have far too much to teach to make it possible to do it well. Yet additional subjects are being added one by one. Now comes Temperance and Hygiene, and in a short time a text-book on Agriculture.

I wish those who are responsible for this state of affairs would try teaching in a country school with say an average of forty pupils, and actually do the work as we are expected to do. If they would not call for relief, after a year's trial, I'd be content to plod on, and forever hold my peace.

If others have found the same difficulty in regard to necessary books and time in which to do their work, let us hear from them, by all means.

PERPLEXITY.

THERE are those who allow the pupils to think that submission is a compliment to a teacher. Order is not maintained for the teacher's benefit, yet thousands of teachers speak and act as though they kept order for their own advantage. Their piteous pleas for order, "I cannot stand your noise," "I must have order," "Stop talking or you will drive me distracted," "You cannot think much of your teacher, or you would not behave so," etc. Order should not, cannot, be made to rest on such a basis. Order should be maintained that pupils may learn better, and that their characters may be developed in the surest possible way, by acting the right. Teachers should never fail to make this clear to their pupils.—*Hughes.*