SCIENCE

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*THE MOSELY EDUCATIONAL COMMISSION.**

I.

THE places visited by me as a member of the commission were New York, Baltimore, Washington, Cleveland (Ohio), Buffalo, Ithaca (Cornell University), Boston, Yale and Middletown (Conn.). But on a previous occasion, six years ago, when I was three months in the country, I crossed the American continent twice from east to west, including the journey from Montreal to Vancouver by the Canadian Pacific Railway. I then spent a considerable time in the west and saw much of Chicago, as well as of Minneapolis and the great wheat region in the northwest. As a student, I was brought much into contact with Americans; this has led me always to take a special interest in them, and I have all my life been a close observer of American scientific work. Any opinions that I may have formed are, therefore, something more than mere impressions derived from my recent brief visit.

It is very difficult to evaluate the part which school education plays in the United States of America. That it plays a real part can not be doubted; but there is clearly a tendency somewhat, if not greatly, to exaggerate its relative importance as a factor in the national welfare. In point of fact, American cuteness would seem to be conditioned by environment rather than by school education. The country was settled by adventurous, high-minded men; the adventurous and restless spirits of Europe have been attracted there for generations

* Report of Professor Henry E. Armstrong, Ph.D., LL.D., F.R.S.

past; the conditions have always been such as to develop enterprise and to stimulate individuality and inventiveness: so that, during the whole period in which the continent has been gradually acquired and settled on, there has been a constant invigorating struggle going on against nature in one form or another, the Indian probably having played no mean part in the education of the race. Such being the case, it is important to remember that some at least of these influences are now withdrawn and that development may, in consequence, be along different lines in future, especially as the enervating influence of machinery is also coming into play more and more.

In some respects, the Americans may be said to be a distinct if not an improved breed. Certain proclivities have undoubtedly been unconsciously selected out, and there has been much cross breeding; hence a race has been developed differing in important respects in its type of thought, if in no other way, from those represented in Europe. Moreover, success has given them belief in themselves and leads them to trust themselves. The natural resources at their disposal are boundless and their outlook is extraordinarily hopeful; they are born optimists, in fact. They have also learnt to work together and to accept and support party rule; they seem, indeed, to tolerate direction and to subordinate their individual opinions to an extent which we have difficulty in believing possible—so much so that they may be said to lack individuality. Willingness to organize and to be organized is almost characteristic of the nation. Uninfluenced by tradition, they are eminently receptive—always ready to consider and test new ideas; nevertheless, the conservatism characteristic of a young country is in many ways still manifest among them.

It is difficult to trace the development of any American peculiarities to the schools—or to find any evidence even that the schools seek to utilize and develop the national idiosyncrasies.

After seeing a number of schools in detail—both common schools and public high schools—it seems to me that they are much as our schools; that the problems they are seeking to solve are our problems; that their difficulties are our difficulties. In matters of organization and administration, we apparently can learn many things from them; but, as regards method, it seems to me that we have very little to learn; indeed, in depth of purpose and originality, our best work may not unfairly be said to be considerably in advance of theirs. But whereas here we have no general belief in education, in America the common school system is universally held in high esteem and its influence is very great. The mere fact that all classes are brought together in the common school is in itself of the utmost importance as affecting the social outlook; even those who prefer to send their children to private high schools seem to think it desirable that they should first attend the common school in order that they may consort with others.

The belief in secondary education, especially for boys, is far less general—it is probably no greater than ours—and yet, it seems to me, that it is by the existence of a well-developed public high school system that America is distinguished most from us and potentially placed most in advance of us.

What has until recently counted as university education here is almost unknown in America. What will count as university education here ere long, as the various provincial universities become effective, is already developed in America to a considerable extent and is advancing with giant strides. The support of university education is become a fashionable practise among

multi-millionaires, and the appreciation of such education by employers generally has reached a point as yet undreamt of here and is growing rapidly, owing to the establishment of an effective working connection between the manufacturing industries and the colleges. The belief in higher education may be expected to grow at a compound interest rate. This, it seems to me, is the great fact to be taken note of, if—as we undoubtedly must—we are to regard education as an effective means of promoting national welfare. It will undoubtedly force on the development of the public high schools. But, as I shall have occasion to point out, American education is for the most part still governed by eminently academic and conservative traditions; in some respects it lacks depth and practical outlook to a strange extent.

The movement which has led here, during the past twenty years, to the erection of technical schools all over the country and of the numerous polytechnics in London, is only beginning to come into evidence in America. Evening class instruction, such as has grown up under our science and art department, is almost unknown there.

In New York and other large towns we saw many fine public school buildings. But if buildings are to be regarded as evidence of appreciation, we may point to those erected by school boards all over this country; it is probable that in size, number and appointments they compare not unfavorably with those to be found in America, taking into account the areas dealt with. The building, it must not be forgotten, appeals to the public sense: it can be pointed to with pride. This is distinctly the attitude adopted in America towards the public school buildings. I am not aware that we take particular pride in the erection of our board schools: it is rather our habit to grumble at the outlay they involve.

The Common Schools.—In interior arrangements even the most modern schools are not superior to our own. And there is even less attempt made in them to provide pictorial decoration. Thring's great doctrine of *thinking in shape* has, if possible, made less advance thus far in the American common schools than in ours.

Much has been said of the importance attached in the American schools to the teaching of patriotism and to the practise of saluting the flag which prevails in them. This involves the recitation occasionally of the formula: 'I pledge allegiance to my flag and to the republic for which it stands —one nation, indivisible, with liberty and justice for all.' This appeared to me to be a somewhat perfunctory exercise when I witnessed it. Thinking Americans with whom I discussed the question seemed to regard the practise as of some value in cities like New York and Chicago, where a large alien element has constantly to be absorbed into the population; but apparently they were of opinion that it was undesirable as a general practise.

It is almost unnecessary to say that the amount of attention paid in the common schools to reading and composition is in no way sufficient or satisfactory, the neglect of English among English-speaking people being proverbial. Apparently no greater effort is made in the American schools than in ours to lead children to read and to become really fond of reading.

The teaching of drawing is also undeveloped. Simple measurement work in association with drawing, which is being so much advocated here and which is gradually assuming importance in our schools, seems to be almost, if not quite, unknown. I did not learn that the attempt was being made anywhere to put the teaching of

arithmetic on a practical common-sense basis.

Although manual training figures in the program, the interpretation put upon the term seems to be very different from that which is usual here, drawing commonly counting as manual training. In some of the schools, where space permits, woodwork is introduced into the upper classes for boys, and cookery and needlework for girls. The belief in such work is evidently growing; but at present the schools are undoubtedly behind ours in promoting it and even more bookish than ours in their tendencies.

The nature study lessons I witnessed, when not specifically botanical or zoological and scientific in character, were eminently superficial and worthless.

As all classes attend the common schools, these can not be compared directly with our elementary schools, but must be thought of in connection both with these and with all other types of preparatory schools.

There are two striking features in them —the air of refinement due to the attention paid to dress, especially by the girls, the preponderating element in most classes; and the attitude of familiarity assumed by the class towards the teacher. Distinctions such as poverty or occupation might well condition even in a democracy are scarcely perceptible. In America the teacher does not seem to be regarded as the natural enemy of the boy—as a person to be circumvented. The method of teaching which appears to be generally adopted involves, as it were, the constant exchange of opinion between teacher and pupil—not, as is here the case, either the communication of information to the class by the teacher or the mere wringing of what is supposed to have been learnt from the pupil by the teacher. The method has both its advantages and its disadvantages. It develops that readiness of address which characterizes young Americans and leads children to give their opinions freely—far too freely many think—on all sorts of subjects; and it encourages cuteness. But it imposes a very heavy burden on the teacher and operates against close study and concentration of attention. In American schools there is no enforcement of discipline by means either of penalties or of prizes. Children are put on a footing with grown-up people and treated as young republicans.

How, then, is discipline maintained? Is it always? Perhaps the average American boy has not such a fund of animal spirits as the English boy—he is sprung from a tolerant race and from an early age tends to ape the behavior of his elders more than the English boy does. Certainly one great cause of good behavior is the presence of girls along with the boys. On the occasion of my former visit, I discussed with one of the chief inspectors in Washington the reasons why the system of mixed classes had been abandoned there and then resumed. I learnt that one of the possible reasons was that it had been found difficult to keep the boys in order when alone. But undoubtedly the chief hold teachers have on their classes is consequent on their maintaining the interest of the pupils. Many of my colleagues on the commission—not teachers—in fact, expressed the opinion on more than one occasion that the teaching was most interesting. But looking below the surface, I did not feel satisfied with all that I witnessed. Whilst every teacher will admit that it is necessary to create interest, we all know that it is not always possible to maintain this at bursting point and that in school, as in the world, uninteresting work must be done sometimes; that, in point of fact, it is most important to acquire the art of doing uninteresting work in a serious and determined way. The American system seems to me to be one which imposes a fearful strain upon the

teachers—especially as they are mostly women. And it has some serious consequences. One of these is inability to concentrate the attention. Everywhere the heads of the high schools complained that the pupils who came from the elementary schools could not concentrate their attention upon their work. Several were of opinion that under the somewhat more rigid conditions of the high school improvement in this respect gradually took place as the pupils moved up. On the other hand, in more than one case it was admitted candidly by the head teacher of the elementary school that the extent to which the children could concentrate their attention diminished as they grew older and passed up the school; thirty minutes, we were told, was the longest period during which boys could concentrate their attention and work effectively. This failing, I believe, is not unknown in our own schools.

Public High Schools.—Although we have no schools which are the precise equivalent of these, some of our higher grade elementary schools come very close to them in many respects. It is noteworthy that, in a city like New York, few who can afford to send their children to private schools make use of the public high school —one chief reason assigned being that the classes in the latter are so large that individual pupils can not receive sufficient attention. Of those who enter, in New York, about fifty per cent. (mostly boys) leave during the first year to go into business; under ten per cent. remain until the fourth year. It is said that a much larger proportion are retained in the schools in the middle west.

In common with all my colleagues, I was favorably impressed by the way in which English literature was taught, but I could not discover that the teaching was carried to a logical end and fondness for reading inculcated.* I found no more evidence that proper attention was paid to writing and English composition than in our schools; the subject which of all others is of primary importance seems to be equally neglected in both countries. I met with no proper attempt to correlate the English composition with any of the practical work.

In the teaching of mathematics and science, the American high schools seem to me to be considerably behind our best schools. I came across little evidence that the practical methods of teaching mathematics and geometry which are coming into vogue here are appreciated; and the old academic methods of teaching science seem to prevail almost exclusively. No proper foundation for such work is laid in the elementary schools.

In one respect there has been an important departure: the recognition of the value of manual training has led to the development of a special manual training department and, in some cases, of distinct manual training high schools; in the latter, manual training takes the place of classics. In some cases, perhaps the majority, these are tending to develop into trade schools and to aim at proficiency in wood and metal work; they are elaborately equipped with tools. Nominally, they profess to regard the manual work from an educational standpoint, but it is quite clear that in most cases the will passes for the deed and that the teachers are not competent to develop the subjects pedagogically.

But we met with one most remarkable

* In the new Morris High School in New York —a magnificent building to accommodate nearly 3,000 pupils—a very fine library will be provided. The head master told us that it was his intention to develop the use of this systematically and that many duplicates would be provided of important books. A feature in this school will be a permanently darkened class-room with electric lantern, etc., into which classes can go to witness lantern demonstrations in connection with geography lessons, etc.

exception in the Brooklyn Manual Training High School. The head master of this school, Mr. Larkin, has conceptions of the educational possibilities which manual training may afford which place him on a special plane. His school at present is very inadequately housed. New buildings, however, are to be provided, and it is to be hoped that these will not be so palatial and ornate as to destroy the true workshop-like character and atmosphere of the cramped quarters in which the work is now carried on. In the first year the boys do woodwork; in the second, metal work—chiefly forging; in the third, printing; in the fourth, machine-tool work. The second-year work was in the hands of a man of exceptional ability, not merely a smith, but an artist, so that the imagination as well as the mechanical aptitude of the boys was being well developed. The printing was in charge of a master who also taught chemistry in the school—an enthusiast who had mastered the art of printing and was teaching it *con amore*. Ocular demonstration of his persuasive powers was afforded by the presence in the workshop of a valuable linotype machine, which he had induced the makers to present to the school. We met with another man of this type teaching woodwork at a high school in Washington. He had been educated in the school and, perceiving the importance of the subject, had served for several years as a pattern-maker in the Navy Yard at Washington; then he had returned to the school as a teacher.

It is men such as these that are needed to put manual training on a proper footing—and it is all important that we should devise means of attracting such men into schools.

The introduction of printing as a school subject may appear altogether absurd, but Mr. Larkin gave us clear evidence in proof of its value. Not only, he argues, is it of importance as a manual, mechanical exercise, as the means of bringing lads into contact with a set of facts outside ordinary experience, as well as of familiarizing them with all that is involved in the production of the books they read, but it is also of value on the literary side. When lads are called upon to set up in type and print off something that they have written and to correct the proof, they begin to realize, in a way which is rarely done by the mere writer, how careless they have been in writing, how poor their style. We were favored with copies of a journal produced in the school—printed and illustrated there—which certainly gave evidence of great skill. Mr. Larkin has a true conception of the educational possibilities afforded by proper manual training: while depreciating the attempt to train up skilled workmen as tending to stereotype the teaching, he sees very properly that it affords opportunities both on the mechanical and artistic side for general culture and that it may be made a most important adjunct of the literary and scientific work. Had I enjoyed no other opportunity than that of meeting him and of learning his views, I feel that my visit would have been a fruitful one.

But elsewhere I found an almost absolute lack of imagination underlying the manual training work—vague ideas of possibilities but neither real understanding nor sufficient executive power—although technically much of it was excellent.

It may be hoped that manual training schools—both primary and secondary—will soon be established here in which at least half the time will be spent at experimental and manual work. There is no more important experiment to be made in education that that of determining the value of such schools. In these schools a whole floor at least should be fitted up as a workshop and every kind of manual work

should be carried on, so that there might be *unlimited manual temptation* in the path of the scholar, who should be free to attempt anything that he liked without following a routine course.

School Management.—It is generally known that the American school system is very ineffectively controlled at the present time and that it is too often dominated by political influences. This is well brought out in a recent article in the *Forum* for October to December, 1903. In New York, both the elementary and the high schools are controlled by an able city superintendent, who has a staff of inspectors under him, and all appointments are made on a civil service basis; but a year or two hence, I believe, a Tammany-appointed inspector may be his successor. All the schools work to programs authorized by the superintendent, one program being laid down for the elementary, another for the high schools. The latter, however, is based on the elective system, a considerable range in the choice of subjects being allowed. There is no doubt that this system is subject to considerable abuse and that 'soft options' are much in request. It is beyond question most desirable that special aptitudes should be developed and that teachers should be in every way mindful of these; but boys and girls can not always be judges of what is good for them, nor have they the necessary worldly knowledge to settle for themselves. The Americans do not seem to have settled any more than we have what are the necessary elements of a rational course of school study.

As they work to a common program, both the freedom of the high schools and the responsibility of their directors are limited in a way altogether unknown here, perhaps to an unfortunate extent. Given an ideal superintendent with an ideal staff, the system might work well. But no special effort is made or is likely to be made to secure such an ideal executive; yet it should be aimed at. The combined intelligence of the teachers must be in excess of that of the executive and it should be brought more into operation; unless the Americans desire to stereotype all teaching, they must be prepared to grant almost absolute freedom to their teachers. This does not preclude either the holding up of example or fair criticism. Both here and there the spirit of cooperation needs to be brought effectively into action. Our education department hitherto has had no intelligence department; it has had no clearly thought-out, definite educational policy; there has been no effective means of keeping the inspectorate informed on all matters relating to educational method and no recognized means whatever of securing exchange of opinion and discussion either among the inspectors themselves or between them and teachers at large. The work of education has been carried on in holes and corners into which outside influences have penetrated with difficulty. In both countries we need to organize the work on a scientific basis; there should be some conscious effort made to substitute the good for the bad and even for the mediocre.

Female Teachers.—Most of us who are conversant with school work were struck by the distinctly low average of attainment in the American high schools. To what is this attributable? In part probably to the conditions which prevail in American life; but in large measure also, I venture to think, to the prevalence of mixed schools and the preponderance of women teachers.

Admitting that it may be possible, even desirable, to bring up the two sexes together in the earlier years of school life, I venture to think that we must sooner or later come to admit that it is wrong to do so during the later years, if the object be to develop a virile man. To put the matter in very simple terms, it seemed to me on

the occasion of my former visit—and the impression was confirmed during my recent visit—that the boy in America is not being brought up to punch another boy's head or to stand having his own punched in a healthy and proper manner; that there is a strange and indefinable feminine air coming over the men; a tendency towards a common, if I may so call it, sexless tone of thought.

But if coeducation be bad in itself, it becomes infinitely worse when the teachers are mostly women; they should rather be men mostly. Nowhere is the claim on behalf of women to equality with men put forward so strongly as it is in the United States. Nowhere, I believe, would it be found to be more disproved in practise, if carefully inquired into. Women have sought in recent times to prove that they can compete successfully with men in every field; they claim to have succeeded, but the claim can not be allowed, I think. They have shown—what it was unnecessary to show—that they are indefatigable workers; and they have shown that they can pass examinations with brilliant success. But what has been the character of the examinations? Almost invariably they have been such as to require the reproduction of learning, not original effort. History records but very few cases of women with any approach to originality; it proves the sex to have been lacking in creative and imaginative power. Those who have taught women students are one and all in agreement that, although close workers and most faithful and accurate observers, yet, with the rarest exceptions, they are incapable of doing independent original work. And it must be so. Throughout the entire period of her existence woman has been man's slave; and if the theory of evolution be in any way correct there is no reason to suppose, I imagine, that she will recover from the mental disabilities which this has entailed upon her within any period which we, for practical purposes, can regard as reasonable. Education can do little to modify her nature. The argument is one which women probably will not, perhaps can not, appreciate. No better proof could be asked for, however, than is afforded by the consistent failure of women to discover special wants of their own—they have always merely asked to have what men have, to be allowed to compete with men. Domestic subjects have been taught in the most perfunctory manner possible.

Among the colleges we visited was that of Vassar—the chief college for women in the states. It accommodates some 900 students. The college is located amidst surroundings in full harmony with the grace of the inmates; their charm of manner overcame us completely, even in the brief period during which we were privileged to fraternize with them. The teachers are mostly men. The instruction is given entirely on academic lines; lectures are delivered on economics, but I could not discover that woman's work in the world—'domestics'—was considered in any specific way; it would come, I was told, under the head of technical education, which is eschewed. Apparently no use is made of the beautiful grounds in which the buildings are placed for nature-study or instruction in horticulture; as one of my companions remarked, nature is looked at only in the laboratory down a microscope tube.

In some of the western coeducational colleges, arrangements have been made to provide for woman's specific requirements, which have given great satisfaction, I am told; but this has been done at the instance of the men teachers.

The women teachers in America, it seems to me, are less likely than ours are to take a feminine point of view in instructing

girls. The general environment seems unfavorable to the development of domestic tastes.

From the point of view that I have ventured to advocate, women teachers must be, for most purposes, relatively inefficient; and as teaching is an occupation in which more than any other imaginative power, individuality, insight and originality are wanted, it is important that men rather than women should exercise the predominant influence. If it be the province of education to mold the race, there is no other question of greater importance claiming our attention at the present time—especially as the difficulty of obtaining male teachers is increasing day by day. In both countries it is imperative that we should discover means of attracting men with practical instincts and of superior mental gifts into the teaching profession.

The Training of Teachers.—The elementary schools, at least in the larger cities, enjoy an advantage over ours in that, I believe, their teachers usually all pass through a period of high school training prior to entering the normal or training school; their outlook is consequently, on the average, somewhat broader. The methods adopted in training teachers appear to be no less academic than ours.

The premier training establishment at the present time is the Columbia Teachers College, New York—a palatial establishment. The teaching given in this college is in part academic, in part professional, the predominant class of student being those who are training to become supervisors, *i. e.*, advisory or teaching inspectors.

I had hoped to find that in this college the academic training had a certain bias imparted to it, just as at our Cambridge a certain professional bias is given to much of the academic training of those who graduate in the engineering tripos. But I was disappointed. And I was also greatly disappointed by what I heard when attending some of the pedagogic classes; there was a high-flown air of unreality about the instruction; too much precept, too little practise; no really severe practise! The whole building seemed to me to be out of character with the work to be done; far too ornate; and the students—mostly women—looked far too respectable and tidy to please me. If they had been men I should have said that they needed to take their coats off and not to be above making their hands dirty. It does not seem likely that teachers so trained will be able to give the simple, practical, common-sense instruction that boys and girls stand so much in need of at the present day. The whole appeared to me to be a good illustration of the tendency that I seem to see in America to be guided by sentiment and emotion, and to work on academic rather than on practical lines. I do not think that the Americans can long claim to rank as a practical nation if such methods are allowed to prevail.

We have sinned and are sinning grievously here in the same way, but there are clear indications that we have recognized our mistake, and that we may shortly enter upon a new era in which common sense will prevail. I saw no such signs in America.

College and University Instruction.—Even if it were necessary it would be difficult to arrive at any consistent definition of the American college; but as a rule it may be said to aim at giving a liberal education rather than professional training. Where colleges or schools for both purposes exist, side by side, they together constitute the university. It is noteworthy that, with a few exceptions, the term university has only recently met with general application; Yale College, for example, obtained the

right to call itself Yale University only in 1887.

The college and university instruction, including that given in technical schools, is of interest to us at the present time from several points of view.

In the first place, in America, as here, great complaint is made that students come to college ill-prepared to do the work;* that games† occupy too large a share of attention; and that the bonds of discipline have been unduly slackened of late years.

Moreover, it is said that those who have been brought up in towns are not such satisfactory students as those who have been brought up in the country. The latter are not only more earnest but more practical. On this account the spirit prevailing in some of the western colleges is said to be far better than that met with in many eastern colleges.

Although the elective system prevails very largely in those cases in which graduation from college is a necessary preliminary to professional study, the course is prescribed. It is very noteworthy that the course laid down is a broad one. Thus at the Johns Hopkins University, the following are the subjects prescribed in the chemical-biological or preliminary medical group:

	Hours Weekly.
First Year.	
Physics	9
Chemistry	9
Rhetoric	3
English Composition	4
Second Year.	
Chemistry	9
Biology	9
French	4
English Literature	3

* Professor J. J. Stevenson, of New York University, deals in a very outspoken manner with this question in the recent January number of *The Popular Science Monthly*. To quote a few sentences from his article: "The old adage says 'he who would command must first learn to obey.' That American lads are sorely in need of such training is only too evident. * * * Such training means—training to think, to reason. Lads too often fail to receive this training in secondary schools, as any instructor who has had to deal with freshmen can testify. Secondary schools to-day are little better than cramming houses to fit pupils to answer odds and ends of questions in papers for entrance examinations. Loose thinking and restlessness under restraint characterize the American students in the lower classes at college; lack of home training may be responsible in part for the latter characteristic, inferior teaching in secondary schools for the former."

† The report of the President of Harvard College for the year 1901–1902 contains for the first time the report of the chairman of the committee on the regulation of athletic sports. President Eliot's comments thereon are highly instructive: "This report is interesting from several points of view. It exhibits, in the first place, the large number of students who are actively engaged in the competitive sports taken together. The figures given are not accurate, but it is reasonable to suppose that at least two thousand students out of the thirty hundred in Cambridge take some active part in one or more of the thirteen sports in which an enumeration of the number of participants was made. * * * The chairman calls attention to the fact that the expenditures for football are steadily increasing. A quarter part of all who take part in this sport are injured enough to lay them up for ten days on the average, and a much larger proportion of those who really play the game are thus injured for the season. The changes in the rules during the past ten years have tended to increase the number of injuries rather than to diminish it. The temporary injuries are so numerous that it is impossible to count on putting any particular eleven men into an important game on a given day. In order to provide the necessary number of substitutes for each place, the football squad often numbers sixty men. Hence large expenditures. The outfit for candidates grows more expensive, because they wear about fourteen pounds weight of padding and armor. On the whole, the game, under the existing rules, tends to become slower and less visible in its details, and therefore less interesting. Moreover, the ethics of the game, which are the imperfect ethics of war, do not improve. The martial axiom—attack the enemy's weakest point—inevitably leads to a deliberate onslaught on the cripple or the convalescent in the opposing line; and the habitual violation of rules, if penalties be escaped, is regarded by many as merely amusing."

Third Year.

Biology	9
Philosophy	5
History and Economics	4
Elective Course	2

English composition and reading, French and German, as well as economics, are included in all the complete engineering and science courses at the Case School of Applied Science, Cleveland, Ohio. The same practise is followed at the Massachusetts Institute of Technology, where, in addition, history (American and European) figures in the program. In these institutions the course lasts four years. The course of reading prescribed in the Case School is an instructive one.

I inquired specially into the teaching of English composition. At the Massachusetts Institute the instructor was taking the utmost pains to select themes likely to interest engineering students; but the possibility of directly correlating the laboratory work with the literary work had not been contemplated.

It appears to me that we may well take a leaf out of the American book and introduce an element of literary study into our engineering courses; but when the question is considered, I trust we shall endeavor to correlate the literary work very closely with the practical work. I did not discover that American students are any more willing to read studiously than ours are.

HENRY E. ARMSTRONG.

LONDON.

(To be continued.)

JOHN BELL HATCHER.

AMERICAN paleontology has suffered an irreparable loss in the untimely death of Mr. Hatcher, which took place, after a short illness, at Pittsburg on July 3.

John Bell Hatcher, the son of John and Margaret Hatcher, was born at Cooperstown, Illinois, October 11, 1861, but at an early age was taken by his parents to Greene County, Iowa, where they settled permanently, and where he received his early education. As a boy, he provided for future college expenses by working as a coal-miner and what he observed in the mines directed his attention and interest to the problems of geology. In 1881 he entered Grinnell College, Iowa, and, after remaining there for three months, he became a member of Yale University, graduating in 1884. His undergraduate years were devoted to the study of the natural sciences, and especially to geology and botany. Some collections that he had brought with him from Iowa attracted the attention of the late Professor Marsh, who appointed Hatcher, immediately on his graduation, as his assistant and at once sent him to the western field to collect fossil vertebrates.

Thus began a career which was unrivalled of its kind, for Hatcher had a positive genius for that particular work, as is well known to all who have had the privilege of accompanying him in the field. Marvelous powers of vision, at once telescopic and microscopic, a dauntless energy and fertility of resource that laughed all obstacles to scorn, and an enthusiastic devotion to his work, combined to secure for him a thoroughly well-earned success and a high reputation. He may be said to have fairly revolutionized the methods of collecting vertebrate fossils, a work which before his time had been almost wholly in the hands of untrained and unskilled men, but which he converted into a fine art. The exquisitely preserved fossils in American museums, which awaken the admiring envy of European paleontologists, are, to a large extent, directly or indirectly due to Hatcher's energy and skill and to the large-minded help and advice as to methods and localities which were always at the service of any one who chose to ask for them.

Hatcher's uprightness and sincerity of