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ADDRESS OF THE PRESIDENT, SIR WM. DAWSON.

In selecting from the multitude of topics, local and general, which present themselves in connection with the occasion on which we are assembled, I have thought it well to descend to first principles, and to notice a few of the general questions that lie at the foundation of educational work.

At the present time no doctrine is more popular than that of evolution, and many enthusiastic persons are willing to believe in the principle, even in cases to which it cannot legitimately apply, where there is, in fact, nothing to be evolved or unrolled, and no adequate cause to produce its unrolling if there were. But evolution is a perfectly legitimate principle where there is a germ to be evolved and the proper conditions for its development. We may all safely believe in the development of a germ lying in a seed, into a plant, or of the embryo cell in an egg into a chick, though even in these, adequate and suitable causes must be at work to further the development. In like manner, nothing is more certain than the development of the child into the man or woman, and in this there are two factors, or groups of factors, one consisting of the life and power of growth present in the

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child, the other in the external influences to which it may be subjected. The one group of factors may be styled the individual potentialities of the child; the other constitutes its education. A child is the germ or bud of a man or woman. If left to itself, it will be evolved into manhood or womanhood by its own spontaneous vitality. If we wish to regulate this process, we must know and observe its natural laws.

The old-fashioned comparison of the child to a block of marble to be hewed into shape by the educator, is therefore altogether incorrect. The true educator is a cultivator training a living plant. The Heavenly Father himself can educate in no other way, for we are the vine and He is the husbandman. If this fact of constant continuous growth is neglected, there can be no true education, or in other words, the growth itself will be the practical educator, and the work of the so-called teacher will be merely the patching of extraneous matter upon it, like tying artificial leaves on a living plant. It may be worse than this, for if the work of education runs counter to the natural growth of the pupil's mind, it may be like the placing of a board or a tile over a tender plant, by which it becomes blanched, deformed and worthless.

Admit these general principles, and we must hold that the work of education is one of the most complex and difficult of scientific arts, an art which must delicately suit itself to all the elements physiological, psychical, and ethical in the constitution of the pupil, and requiring for its successful practice the knowledge of a great number of scientific principles. We may well ask—Who is sufficient for such a work? and I feel sure that the greater number of experienced and successful teachers have long ago become impressed with a deep sense of their own weakness and insufficiency. More especially will this be the case when we bear in mind the necessary limitations and disabilities of the work of the educator, arising from the time available for its prosecution, and the rapid development of mind and body during that time, from the varied requirements for special studies depending on the needs of society, from the necessity of teaching large numbers of children having varied powers and tendencies in the same class and by the same method, and from traditional mistakes, as for example, a defective method of spelling and artificial classifications in grammar.

Thus the thoughtful educator, while rightly appreciating the problem he has to solve, is placed in the midst of difficulties which are in individual cases often insoluble. It would, I think, be easy to show that the discordant views which prevail on such subjects as the range of school studies, the relation of these studies to health, the expediency of payment for results, the conducting of examinations, the relations of scientific and literary studies, and the bearing of moral and religious culture on the work of the school, largely depend on the more or less wide and accurate views which may be held in relation to the fundamental point above stated, that the educator has to train a being in a state of active growth, and differing in every succeeding day from its capabilities and attainments of the day before. Keeping this principle in view, we may now glance at a few current topics of educational discussion.

If we ask what studies should first occupy the attention of the youthful pupil, two apparently contradictory answers are at once given. First, it is unquestionable that the child is naturally an observer and experimenter with everything within his reach. Therefore, his early lessons should be object lessons, and he should begin his education with science. But then it is also evident that memory and speech are developed more rapidly than thought, therefore, he should begin with words and memory-lessons. The truth concealed under this apparent antagonism is that the average child conducts his own education in the way of accumulating facts and experiences, trying to express these in speech, and thus learning to think and generalize. This is the natural process, and one absolutely scientific, and to be imitated as far as possible in our clumsy methods.

It was supposed to be a grand discovery when the framers of the English educational law, hit upon the method of payment by results, but nothing could have been more disappointing if we are to judge by what may be called the ultimate results of the method itself in complaints and controversies, yet surely it is reasonable to pay rather for what is done than for the mere form of doing it. The real question is as to the results actually desired. If the results are the cramming of a certain amount of brain-racking technicalities, tested by severe examinations, it may well be said that such results are dear at any price. But let us suppose

that the increase in weight, muscle, and healthy complexion among the pupils, their actual growth in practical mental resources and high moral qualities, are among the results looked for, then payment by results may not be so bad as it has been called, if proper methods could be devised for measuring the results attained.

The time allowed for education is all too short, but are we justified in lengthening it by exacting of children five or six hours of brain-work per day. If we do this, what is to become of the physical, æsthetical, mental, and spiritual growth? If we could judiciously unite all these kinds of education, it might be possible to go on educating all day without weariness or undue pressure. But it would be better for the teacher to content himself with two hours of mental work per day, if the rest of the time can be spent in something useful and profitable. One thing at least is certain that when fatigue of brain or mind begins, education ceases.

The taste of the present time runs strongly in favour of examinations. Block up, with *chevaux de frise* of hard examination papers, the access to every distinction and profession, and take these examinations out of the hands of the educator and place them in the keeping of crotchety old gentlemen educated at least a quarter of a century ago, and all will be well. But examination, without previous good education, is as worthless as a well dug in a dry sand bank, and examination itself is a scientific art amounting to no less than the accurate testing of the whole development of the learner up to a certain point—an art to which no one is systematically trained, and which comes naturally or by experience to only a very small percentage, even of men of learning. The examination craze of the present day is one of its features which will be most heartily condemned by the coming age.

The battle as to the question of health and education has lately raged with great violence around the higher education of women; and the trumpet-blast which the President of the Medical Congress at Brighton, Dr. Moore, felt it his duty to blow, has stirred up the strife with new acerbity. We are all wrong, according to Dr. Moore, in attempting to educate women. Woman is a physiological machine understood only by medical professors, and cannot be touched by the educator without a strain and over-pressure

fatal to all her proper functions. In reading Dr. Moore's address, one begins to feel thankful that the old-fashioned Moslem and Hindu Zenana still exists with its happy inmates, secluded from the march of education, occupied only with their baths and perfumes, and destitute of all undue pressure of learning and ideas. It is clearly to such properly nurtured womanhood that the world must look for the mothers of the great and good of the coming time, and it is to be hoped that "Zenana Missions" may not interfere with their healthful continuance. Some of Dr. Moore's illustrations are, however, fitted to raise doubts as to his own infallibility. He informs us that the mother of Bacon could not have written the *Novum Organum*. That may be, but surely it did not constitute her special fitness to be the mother of the great philosopher. We rather trace this in her active intellect, and in the fact that she had received a thorough education at a time when education was at least threefold as hard a process as it is at present. He tells us that the mother of Bonaparte was obliged to share the fatigues and dangers of her husband's campaigns; but I am sure that if we were to send the prospective mothers of England on campaigns in the Soudan, or those of Canada, to wade through the snow and mud, with our volunteers in their expeditions in the North-west, we should find the pressure even greater than if we sent them to college, and that our future Napoleons would be purchased at too dear a rate. If Dr. Moore had thought of enquiring as to the physiological effects of late hours, luxurious diet, and the over-pressure of tight garments on one class of women, and those of hard manual labour and burden-bearing on the peasant women of the Continent of Europe, he might have thought less of the evils of education.

Still, one wrong does not excuse another, and it must be admitted that brain-work alone, without air and exercise, will not produce either perfect man or woman; and that woman, owing to her more active temperament and greater ambition, is more easily stimulated to excessive exertion than man. Nor can there be any doubt that the present desire of women to have precisely the course of study which custom and routine have prescribed for men is scarcely wise. They could do much better for themselves by striking out a new course, as has practically been done by the more advanced of the colleges for women. These are questions

of the highest interest for educators, but are not to be discussed on the low physiological level occupied by Dr. Moore and some other old-fashioned physicians.

While physiologists deprecate the overstrain to the physical system caused by severe study, other doubters are concerned about the moral and religious tendency of education, and are continually insisting on the necessity of some special doctrinal teaching. I have always felt that it is a poor compliment to Christianity to hold that the Christian family, the Sabbath school, the Christian Church, and the Word and Spirit of God, will be unable to convert the world, without the help of the poor over-tasked teacher. I have also seen that it is the life and personal influence of the teacher rather than any form of religious lesson, that can really benefit children. Farther, there can be no doubt that even a secular school, with good discipline, self-denial, and kind guidance, is nearer akin to spiritual life than is the training of the street.

But we must not forget that Christianity is the religion of a book. Its founder came to give intellectual light as well as salvation. He says that he came to bear witness to the truth, and affirms that truth alone can make men free; and he sent forth apostles and evangelists to fix in writing this testimony to truth. He thus appealed to the educated intelligence of men, and proclaimed that His true followers must be readers and thinkers. The Bible thus becomes the Magna Charta of education, and it is only where it is a household book that education can have its full opportunity, and that mental activity and progress can co-exist with active and enlightened Christianity. It follows that with Christ as our guide, and as Protestant educators, we have little to do with the teaching of any particular creed, and that our main business in connection with religion, is to train men and women capable of reading and understanding God's word for themselves. That was a grand and far-reaching resolution of the New England Puritans, that they must have enough education to enable every man to read the Bible, for while the Bible contains much that the simplest reader can understand, it also affords scope for the deepest study of the most cultivated minds.

Another and very different point on which the principle stated in the opening of this address, throws light, is the question of

technical education. The pupil must be a boy or a girl before being an artizan or a worker. Hence the first duty of the educator relates to that general culture which shall fit for any trade or occupation. Whether the educator shall go beyond this into the specialties of particular arts must depend on the requirements of the case. In communities where certain arts are of special importance, it may pay to provide special apparatus and means of training in these. Where the aims of life are very various and one man may have to play several parts, it may be best to give general culture only. It is, however, in all cases, good, whenever possible, to give some varied training in ordinary handiwork and the use of tools, in working, for example, in wood and metal; and it is most useful to give some insight into the laws which regulate the great art of agriculture, which lies at the foundation of all other arts. This can, fortunately, be done, as an accessory and help to the ordinary school work.

Lastly, we are brought by our principle of simultaneous growth and training, face to face with the problem of science-teaching, and of the relation of science to literature in education. In the wider sense of the term science, it really includes all that intellectual education can effect. Knowledge, logically arranged, and traced to the inductive and deductive conclusions to which it leads, is science in this wide sense. Scientific habits of thought cover all that is necessary for the practical working of mind. Applied science includes whatever men can do by turning to account the mastery which mind acquires over matter. Even the teaching of languages should not be divorced from science, for there is a true science of language, aiding the pupil in its acquisition and use, and cultivating his mind in the process. The question here is not as to teaching children or young people botany, chemistry or physics, but as to accustoming the mind, by the study of some subject or subjects in a scientific manner, to the orderly pursuit and use of knowledge, and the orderly exercise of mental power.

Whence then comes the conflict, in our educational courses, of older with newer studies, and especially of ancient languages with modern science? One cause is a mere question of time. Before the great extension of modern science, the literary element of culture, with some abstract mathematics and philosophy, engrossed the

entire course of study; and these things, taught in large quantity and by crude and unscientific methods, occupied the whole time of the student. But modern science strides into the field and imperiously demands room. The time of the student cannot well be extended. His mind must not be overtaxed. So there comes a conflict, and each department of study struggles for the possession of the unfortunate learner, or he has to be content with a smattering of all, odious and of little use; or, under a paltry compromise, he is permitted to substitute one for another by a system of options and exemptions.

If it were desirable that the old learning and the new should fight out their battle to the uttermost, it would be difficult to decide between them. The old culture has much in its favor. It is refined, thoughtful, literate, bookish, leading to what is termed scholarship, and to much that is pure and beautiful in taste and expression, as well as to that power which comes of well-ordered thought and language. Such polish and mental grace as a result from it are certainly much to be desired. But it is eminently unpractical; and but for the traditional custom which places it at the door of entrance into learned professions, or for its leading to teaching positions, in which the old grind is to be gone over with a new generation, it would be of little service in the struggle for existence beyond the habits of study and application which it may foster. The new science, on the contrary, is full of the spirit of the time. It is fresh and vigorous and rich in practical applications. It trains the mind for the actual work of life, and furnishes it with the knowledge likely to be needed in every-day affairs. On the other hand, its methods are somewhat crude. It wants the finish and polish of age, and has little of the refined culture of the literary course. It often exaggerates these defects by a defiant skeptical turn, which gives it a hard and unfeeling aspect, and places it in conflict with the higher sentiments of humanity. But this last evil has no essential connection with it.

The statement of the case shows what is wanted. Let young men study either languages and literature, or physical science, or parts of both, but let the whole be thrown into the educational crucible and fused together. Let the languages and literature be imbued with the scientific spirit. Let the science be refined by higher literary and æsthetic culture. Let both be treated as pre-

parations for practical life, in imparting useful knowledge as well as gymnastic training, so as to nourish the mental fibre and give it power and flexibility.

The practical difficulty in this, at present, is that we cannot find enough teachers of the right kind. Few teachers of language and literature have been trained in scientific habits of thought, or even in the science of their own subjects. Science teachers are often mere specialists with limited culture and limited range of thought. It is usually only by combining these men in large institutions, and under skilful organization, that even moderately good results can be secured.

Let us turn now to the more special subject of education in science. The science educator has first to see that the mind of his pupil is stored with facts,—healthy food, whereon mental digestion may work,—supplied in ample yet moderate quantity. By facts I mean here not merely verbal statements, but things or processes actually perceived—things seen, heard, handled, tasted, felt by the student himself. These are grateful to all young persons of any intelligence, and they constitute the real foundation of knowledge, that on which general principles and abstract truths must be built. In the science of rocks and minerals, it were a vain, useless, and pedantic kind of teaching to discuss the geometric laws of crystallization with a student who had never seen a mineral. The first thing is to see and handle the crystal and measure its angles. Then comes the desire to know the causes which produced this beautiful form, and the laws which regulate its growth. Taught in any other way, elementary science bears much the same relation to mental growth that a lecture on cookery would bear to the bodily growth of a child.

In the getting of the facts which are the raw material in science, there is much training. There is necessarily observation, educating the senses. Inseparably connected with this is that art of mental analysis by which we take to pieces the general conception of a complex object, examine its constituent parts, one by one, and then endeavour to conceive of them as a whole. To the ordinary onlooker a flower is merely a flower, or little more than a patch of colour, more or less beautiful or showy; but to the trained observer, it is a complex mechanism, made up of several circles of parts each having its special form, and the whole con-

spiring to make up the symmetry and beauty of an organism having important uses and adaptations. This training of observation and analysis is of great practical value in the ordinary business of life, independently of its scientific applications.

The collecting of facts implies also another valuable mental exercise. This is comparison. We cannot see rightly any two objects related to each other in any way without making comparisons. They may differ from or resemble each other in different degrees with reference to form, colour, size, weight, hardness, and a variety of other properties. The scientific mind and the practical mind are constantly occupied in making comparisons, the results of which constitute the most valuable kind of practical knowledge, while the act of comparing develops and strengthens the power of discrimination.

Another mental exercise connected with the study of science is classification. The due ordering of degrees of resemblance and difference, not in trivial and accidental but in essential characters, not by one single character only, but by the aggregate of all characters, is an invaluable power; and its exercise is at once demanded so soon as we know any considerable number of objects. Following this, comes the grouping of objects in classes, orders, genera, or species, each of these groups having its logical status and its proper value relatively to other groups of the same or different rank. But for such classification the multitudinous objects in nature would become to us a mere incomprehensible muddle. With it, they resolve themselves into rational order, while in the process, we acquire habits of clear, orderly, systematic thought and arrangement, of the highest value, both in science and in ordinary life.

These are, after all, among the lowest things in scientific culture; for the mind of the student is next directed to the principles of causation, and to that grand idea of natural law under which we generalize phenomena. It is here, perhaps, that our science-teaching most fails; for few text-books and fewer teachers have any true grasp of natural laws and their grades and interactions in the grand unity of Nature. This is, perhaps, the principal reason why science in our times occasionally falls into disrepute, by lending itself to the service of a corrupt and shallow philosophy—a “pseudonymous gnosis” or “science falsely so

called," too common at present. We shall best understand this by looking at the other side of the question, and noting how true science may connect itself with the higher interests of mankind.

Such connection appears in the mastery which science gives us over nature. It is true that much of this appears in ordinary life as mere routine and rule of thumb. But even what the multitude practise by mere tradition must have been invented long ago by some thoughtful mind, and without the continuance of such thought the practice will gradually deteriorate. New scientific facts, skilfully used, scientific habits of thought brought to bear on old facts and processes, constitute the material of discovery and progress. For such work, the most gifted minds must be thoroughly trained, that they may take the foremost places in the march of society. It is equally necessary that the actual workers shall have such culture as may enable them intelligently to execute scientific plans and processes. It is also necessary that the general public shall have some culture that it may appreciate, sustain, and use for its ordinary purposes the new powers bestowed by scientific discovery, and that it may distinguish real invention and discovery from mere pretence. The highest special training and the most rudimentary science-teaching of the elementary schools should co-operate with reference to these utilities. The dead level of absolute stagnation, or the want of comprehension which causes the discoverer and inventor to be persecuted as a wizard, represents the lowest stage of humanity, as opposed to a progressive science supported by an intelligent community.

Science, as an expositor of nature, is closely connected with our perceptions of beauty and our advance in taste. Good works of art are rare and costly, and abortions of art, hideous and depraving to taste, are too often those ordinarily presented to the eyes of men. Good works of nature, beautiful, symmetrical, harmonious, and withal perfectly adapted to their uses, are strewn around our daily paths, and are as accessible to the poorest country child as to the millionaire. What a great lever is here for the elevation of the common mind, if only we put our hands firmly upon it! We must do this; for though a certain perception of beauty is a natural gift, it becomes so dulled by familiarity and neglect, that it is necessary to throw the light of science on

the most common and the most attractive objects, in order that they may be fully perceived and have their due effect upon the mind. Science effects this in two ways; first by disclosing minute and microscopic beauties, not visible to the ordinary eye, and secondly, by enabling us to perceive the great harmony and unity of nature. Science-training is not what it should be, unless it keeps both objects in view, and accustoms its pupil to work minutely and accurately, and at the same time, to rise to broad, general views.

I am far from maintaining that science education, as it exists in our institutions of learning, actually fulfils the utilities thus sketched, and it would be interesting to inquire as to the reasons of its defects, but the time at our disposal is not sufficient for such an investigation.

In conclusion, I have referred to these several and disconnected topics in illustration of the truth that certain profound, general principles underlie the work of education, and that it is only by constant attention to these that we can hope to avoid unnecessary controversy and to arrive at sound theory and practice.

