

university by bringing the award of scholarships within the domain of the Joint Matriculation Board, higher papers being set for this special purpose. The good working of the system, he said, was owing to the fact that the Matriculation Board contained a substantial body of representatives of the schools.

In connection with the meetings there was an exhibition of apparatus, etc. Perhaps the most important thing shown was the use of crystal violet to compare the hydron content of aqueous solutions of acids by the colours obtained on adding measured proportions of the dye. The "weaker" the acid, the nearer is the tint to the violet end of the spectrum. Mr. R. G. Durrant (Marlborough College) claims that the margin of error in comparison with conductivity data is very narrow, and that his method is both simple and quick. Mr. Durrant also showed the use of malachite-green solution in differentiating the flames of the alkali and alkaline earth metals by cutting out the orange band from the spectrum; by this means the calcium flame appears bright green and the strontium one ruby-red.

During the nineteen years of its life the membership of the association has been restricted to the public schools. The basis has now been broadened so as to include science masters in any secondary school which is under the control of a corporate body. The name has therefore been changed to "The Science Masters' Association." Mr. W. D. Eggar, of Eton College, and Capt. W. J. R. Calvert, of Harrow School, are the new secretaries. Mr. W. W. Vaughan, the Master of Wellington College, was elected president of the association for the coming year.

#### MR. FISHER AND THE BOARD OF EDUCATION.

MR. LLOYD GEORGE is presumably busy forming his new Government, and rumour has it that many changes of *personnel* are imminent. Some two years ago, on the formation of the second Coalition Government, a novel departure was made under the stress of war conditions in the selection of men for certain appointments, not in virtue of political services for which due reward must be found, but in respect of peculiar fitness and proved experience of the work to be done. Among those invited to accept office was Mr. H. A. L. Fisher, Vice-Chancellor of the University of Sheffield, who had won the confidence of all classes in the area covered by the operations of the University by the tact, judgment, and broad sympathy with all forms of education he had displayed in the discharge of his duties. He was invited by Mr. Lloyd George to accept the Presidency of the Board of Education vacated by Lord Crewe, and he consented, a seat in the House being found for him in the Hallam division of Sheffield. Mr. Fisher has proved a success, not merely in the discharge of his duties as President, but also in the advocacy of a far-reaching, not to say revolutionary, Education Act, and of a measure of long-delayed justice to the teachers in the shape of a Superannuation Act, which will go far to make the profession of the teacher attractive. He has won golden opinions by the skill and judgment he displayed in piloting these measures through the House, and he has breathed a new atmosphere into the Board of Education which "brings hope with it and forward-looking thoughts." These two measures stand to his infinite credit; they still need careful guidance in order to reap their full fruit and to make way for further developments; and yet it is said that a change in Mr. Fisher's position is imminent, born of his very success. No department of the State has suffered more than that of education by the constant changes

of its chief—there have been no fewer than ten since 1902—but it would not be so were its status and its vital importance to the national well-being rightly regarded. It ought to rank with the highest Cabinet offices, and be remunerated accordingly. It demands special knowledge and experience for its due discharge, and in Mr. Fisher we have the man who rejoices in both, united with an enthusiasm and devotion but rarely witnessed. That he should be assigned some other duties in the political sphere would excite a feeling of grave disappointment throughout the country at this critical time.

At the annual meeting of the Incorporated Association of Headmasters on January 3, the president of the association, Mr. F. B. Malim, Master of Haileybury College, proposed, and the Rev. Dr. David, Headmaster of Rugby, seconded, the following resolution, which was adopted unanimously:—"That this association desires to express its profound satisfaction at the educational developments initiated and carried by Mr. Fisher as Minister of Education, and its conviction that it is of the first importance in the interests of the nation that Mr. Fisher should continue in that office and should be enabled to complete the great work of which he has made so admirable a beginning; and that this association would regard it as a national calamity if Mr. Fisher should be required to leave the Board of Education at this juncture."

Following the headmasters' lead, the teachers assembled at the joint conference of educational associations at University College, London, on January 4, carried unanimously a resolution in the same sense, which was proposed by Sir Henry Hadow and seconded by Miss Busk. The motion was in the following words:—"This conference, composed of thirty-nine educational associations, which is now assembled at University College, London, wishes to urge the importance of retaining Mr. Fisher as Minister of Education. The educational developments accomplished by him during his period of office have given profound satisfaction to the teaching profession. Further, the confidence established between the Board of Education and teachers through Mr. Fisher's appointment and achievements has inspired teachers with a high sense of their responsibility in the training of the youth of the nation, and it is of the utmost importance that this confidence should be maintained and strengthened by the continuance of Mr. Fisher in the office of Minister of Education."

#### OBSERVATIONS ON THE RESULTS OF OUR SYSTEM OF EDUCATION.<sup>1</sup>

MANY problems of education would be solved if a really good scientific test of the results of education could be invented. I can imagine that if such a test were to be applied, say, once a year to all the forty million or so residents in this country, beginning with the British workman and ascending, or descending, to the Houses of Parliament, and even to the Royal Society, the results might be surprising. But as no such test is known, all we can do is to try to form some kind of personal estimate and integration, just as we try to measure lengths and areas by the eye—a method full of fallacies, but unfortunately, perhaps, the only one available. I propose, therefore, to offer for your consideration, as briefly as possible, my own life-notes on the subject.

Let us begin with physical education. Here, I think, the British system has deservedly set the fashion throughout the world. The young men of most coun-

<sup>1</sup> From the presidential address delivered at the annual meeting of the Association of Public School Science Masters on December 31, 1918, by Col. Sir Ronald Ross K.C.B. K.C.M.G., F.R.S.

tries have certain national games, but since the time of the ancient Greeks no nation has so assiduously practised in the whole field of bodily exercise—very much, in my opinion, to our advantage. That field is a very large one—first, the great natural exercises, running, swimming, rowing, riding, and climbing; secondly, the games, cricket, football, tennis, polo, and others; thirdly, the sports, fishing, shooting, and hunting; fourthly, special kinds of muscular training, such as gymnastics, boxing, and fencing; and, fifthly, military training. Now all these are invaluable, not only for the body, not only to maintain the *mens sana in corpore sano*, but also as exercises for most of the faculties of the mind and spirit. For this reason I attach the least value to the artificial exercises, so popular on the Continent, as gymnastics and fencing; and not so much to the games as to the natural exercises and sports. It has been the great merit of British education to have discovered the superlative educating capacity of what are often called mere pastimes and amusements. Yet this has been quite a modern discovery, and many nations are still only just learning the lesson from us. When I read Russian and French novels, and even some works of Dickens and other English writers, I seem to be living in a museum of pathological specimens, and not among men and women who have breathed God's air and seen the sunlight.

This leads to the all-important question of human physique—too large a theme for discussion now. But from my own observations made in many countries I conclude that variations in physique show such peculiar local distribution that we must attribute them more to environment than to heredity. What the principal cause of physical deterioration, combined as it generally is with mental and moral deterioration, may be escapes me. It cannot be entirely disease, or alcoholism, or underfeeding, or overcrowding, or climate, but must be some unknown factor which has not yet been discovered. On the other hand, speaking as a military medical officer, I will say with certainty that a period of open-air military training under discipline, combined with good food, greatly improves the physique, the health, and the mental powers of young men, let alone their manners and *moralé*. For this reason I should be in favour of universal military training everywhere; but, on the other hand, I admit the force of the argument that such military training may be an incentive to puerile wars—though I am not sure of it. On the whole, therefore, I would at least suggest an alternative scheme—that is, a scheme of what I call "health conscription," consisting of at least a fortnight's compulsory physical training, under discipline, in the open air, for both sexes every year for five years between the ages, say, of fifteen and twenty. There will, of course, be the usual objections on the score of expense and interference with so-called liberty; but the alternative appears to me to be continued deterioration of body and mind. The public schools of Britain have set the example in what may be called physical religion; my proposal is merely to extend that faith to all classes.

Coming now to the actual knowledge obtained by the young in our schools, I have concluded that it is really not very much. My complaint (and that of others) is not so much as to the total amount of information imparted as to the direction of it. As everyone knows, our teaching has been concerned chiefly with mathematics and the classics, with the outlines of history and of English literature. First taking mathematics (which is a hobby of mine), my observation is that few young men know even the aims and objects of the science, much less its applications, although they may have studied it for years at

school. If you ask them they will reply, "Mathematics is doubtless very fine, but I don't know what the dickens it is all about; and, anyway, it is no use to me." The reason for this is that the schoolboy is not pushed fast enough into the heart of the science, which is the calculus. He is kept, so to speak, pottering about with petty problems in the porch of the temple, and is never allowed to look into the temple itself and to see the beauties within. In fact, the whole subject is taught, not as a great science, but as an opportunity for exercising the mind by a system of puzzles. The error is that of entering into too great detail at the outset. Instead of climbing the mountain, we are kept wandering among the boulders at its base; we become tired; we abandon our enterprise; and the time and money spent on it are almost entirely wasted. I once wished to give a simple mathematical demonstration to a class of more than twenty medical officers; only one of them knew the meaning of a differential coefficient!

As regards the classics, my complaint is, not that boys are taught the "humanities," but that they are *not* taught them. The fundamental mistake seems to be the same as in mathematics—too great detail at the outset. The study of the history, literature, art, and policies of the human race degenerates into the meticulous study of the alphabet of the subject only—that is, Greek and Latin grammar. Why do we still learn these languages? In order to read Greek and Latin literature. But after we have spent years in learning the languages, we become so tired of them that we do not read the literature at all! I am a bad linguist, but an ardent admirer of classical literature; yet when I was a young man I noted that many of my friends were good linguists, but hated the literature. Surely a waste of time and money again. The book is opened; a few words are deciphered; the scholium is read; and the book is closed again—and for ever.

So also with our teaching in most things—we potter about the porch and never look into the temple at all. How often, for example, are our boys taken into the picture galleries, those great temples of the human spirit, and there taught the history and the meaning of the art enshrined in them? Or how often are they taken to hear the reading of our own national poems or the music of the great composers? Seldom, I think; and when they escape from school they take to the reading of shilling novels and the viewing of contemptible plays.

It is usually, and rightly, maintained that the aim of all education is to endow the young with character, judgment, and knowledge; but when people argue that the relative importance of these qualities is in the order given—that character comes first, then judgment, and lastly knowledge—I am inclined to disagree. We have here, indeed, a trinity of elements all necessary for educational salvation, but all three are so closely knit together that we cannot do without one of them. Without character one can possess neither judgment nor knowledge; without judgment, neither character nor knowledge; without knowledge, neither character nor judgment. How, for instance, may a person who consents to remain ignorant of all the knowledge which science has given to us be said to possess character? And as for judgment, it is not a faculty bestowed upon us *a priori* at birth, but one which grows with exercise. Shelley fixed the argument when he said of one of the highest virtues:

Love is like understanding, that grows bright  
Gazing on many truths.

Similarly, breathing, sleep, and food are all necessary for bodily salvation; and one might as well say that

the relative importance of these is in the order named. The point is worth noting, because it has become the fashion lately to decry knowledge especially. "Be good," says one, "and let who will be wise"; and Pennyson exclaims of knowledge, "Let her know her place; she is the second, not the first."

Such sayings are based upon a false psychology; for the mind is not a thing of only one or two dimensions, but of three, and there is no first and no second where all three are equal. One might as well say, "It is nobler to breathe and to sleep than to eat; therefore let us do without food." And, indeed, this is the actual faith of the Indian fakir, leading to a futile philosophy which was becoming very prevalent even in this country before the war, and which I called "fakirism." When this evil spirit enters into the mind of a nation, that nation is doomed. Like the Indian fakir, it will be content to sit by the roadside of life and to achieve nothing thereafter except the pursuit of idle dreams, as many nations have done and are doing. It is your mission, I take it, to contend against this spirit, to rouse the fakir, and to put some of the abhorred beef and bread of natural science into him, so that he shall begin to do honest work again.

All this is really very pertinent to our theme. For if knowledge is of no account, why trouble to teach any at all? But if it is of some account, then why not teach knowledge that is useful as well as sound? But here we strike at once across two dogmas which I have often seen repeated in educational literature. The first is that the object of education is not to impart knowledge, but to exercise the mind in the art of acquiring knowledge for itself in after-years. There is some truth in that, but also a fallacy. For how can we exercise a mind in the art of acquiring knowledge except by the practice of that art? We might as well try to teach a boy to swim without putting him in the water. Then there is the second dogma, which is just the opposite—that what is taught at all must be taught thoroughly. Now I am no teacher of young boys myself, but I doubt the policy. I think that it is advocated in disregard of the natural law that living beings tend to hate a food which is offered to them too constantly. Moreover, we can never know in which direction a boy's aptitude really lies; and, lastly, it is impossible to teach anything thoroughly to anyone, for all knowledge is infinite. I conclude, therefore (though I may be wrong), that it is not good to bury a youth at the bottom of a mine in order that he shall search there for some gold which perhaps he will never find; but that it is better to take him speedily to a height whence he can survey the whole world and choose for himself the field for his own future work.

Neither you nor I will pretend that natural science is to be the only subject to be taught; but I cannot conceive how anyone who does not possess some broad knowledge of the immense accumulation of facts about Nature collected by humanity during the last two thousand years can dare to call himself an educated person. Some years ago a headmaster whose name I have forgotten maintained that a study of the stars is unimportant for men. He meant, not men, but earthworms. A man is, or ought to be, something more than an animal, and the very definition of him is that he *shall* study the stars.

Of course, in this very brief survey I have been obliged to omit reference to some points even of the first importance, such as manners and *morale*, for instance; and to exclude university education, which is the privilege only of a few persons. I will conclude now with the following summary of my own opinions—for what they are worth. I think that our system of open-air education, in which the public schools

set the example, is a most invaluable and essential part of education. Closely connected with it is the principle of personal honour, good temper, and duty—that is, a spirit of *noblesse oblige*, which that open-air education, more than anything else, fosters and inculcates. On the other hand, I think that our system of education is defective as regards the imparting of fundamental knowledge. Most of the great knowledges of humanity are not implanted in the minds of our youth—not only the great discoveries of science, but also the great discoveries of literature, including classical literature, and of the high poetry, painting, music, and philosophy, which constitute the principal heritage of the human race. Indeed, knowledge is often actually derided by the numerous apostles of "fakirism" in this country, or replaced by a useless lumber of unimportant matter; and foreign languages and many of the petty but useful arts of life are much neglected. Hence the whole intellectual side of life is too frequently ignored, or even despised, by the masses of the people, with the result that their judgment is starved for lack of facts, and that they become too often the slaves of fads and quakeries and unproven dogmas of every description—party politics, meretricious propagandas, ignoble creeds, and even sometimes superstitions that savages would laugh at. But behind these and other defects the nation possesses by nature a kindliness, a sense of humour and fair play, and an unopposable force of good intention which have made it during the last four years the pattern and exemplar of the world.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. M. C. RAYNER has resigned her appointment as lecturer in botany (lecturer-in-charge) at University College, Reading.

DR. R. M. CAVAN, of the chemistry department of University College, Nottingham, is leaving shortly to take up his duties as principal of the Technical College, Darlington.

THE sum of 300*l.* has been given by Mr. G. T. Hawkins, of Northampton, towards the building and equipment of a pathological laboratory at the Northampton General Hospital.

MR. W. H. WATSON, of the chemistry department of the Northern Polytechnic Institute, has been appointed vice-principal and head of the chemistry and natural science department of the Municipal College, Portsmouth.

THE organised laundry trade is establishing a research department, the object being to increase efficiency through science and invention, and towards this a Croydon launderer has offered 100*l.* and 50*l.* yearly for five years.

TWO Theresa Seessel research fellowships, each of the value of 200*l.*, are being offered by Yale University. The fellowships are intended to promote original research in biological studies, and are open to men or women. Applications, accompanied by reprints of scientific publications, letters of recommendation, and a statement of the particular problem which the candidate is prepared to investigate, must be made before April 1 next to the Dean of the Graduate School, New Haven, Conn., U.S.A.

GOOD progress has been made in the formation of the Society of British Science Students, to the inauguration of which attention has been directed already in these columns. A temporary executive has been elected, of which Mr. P. E. Owens, 28 Jesse