ing. Science was then in its infancy. Throughout the nineteenth century it was advancing by leaps and bounds. In this twentieth century we meet it at every turn; there is no getting out of its path. That this is truly the age of science we have no lack of evidence in the present war, but the statement is no less true and is even more important in its application to the occupations of peace. And if we wish to live up to our age we must do what in us lies to promote the progress of science. The mere diffusion of scientific knowledge throughout the community will be directly beneficial; but, besides this, certain important consequences must follow such diffusion. Not the least of these is the capability of appreciating the fact that it is necessary for our prosperity—nay, for the continuance of our very existence—that in every possible way knowledge of science should be advanced. Let us make no mistake on this point. The nation which recognises this necessity will succeed, the nation which refuses to recognise it will fail.

We make no claim to have eminent representatives of science in the Cabinet. We believe in the cobbler sticking to his last. The qualities for which politicians are chosen are rarely found in men who devote their lives to the pursuit of science. But we think that even Cabinet Ministers should know something about the world they live in and the bodies they inhabit. Surprise has been expressed at the singular ignorance displayed by distinguished statesmen of simple facts in chemistry and physiology, familiar to the most junior student. This ought not, however, to be surprising. What chance have they had to acquire any knowledge on these subjects? Usually none at all. We meet with the same kind of ignorance in such a generally well-informed quarter as the editorial column of a newspaper; nor can this be otherwise considering that the journalist has as a rule the same kind of education as the politician—an education in which science has occupied no part. Neither is able to distinguish between a real and *soi-disant* authority on a scientific subject, and for this reason we frequently find the utterances of a quack quoted as of equal value with those of a master in science. And if men like these—men who have had the highest educational advantages which our schools and universities can afford—are so deficient in knowledge of things around them: things which really matter, and which affect the well-being and prosperity of the whole community: what can be expected from the ruck of their fellow-graduates who have taken—or perhaps been excused—the ordinary degree at our universities, and who have acquired in that laborious process little but a smattering of certain ancient languages, which they very soon contrive to get rid of? Or, if anything remains, it is of no possible use to them in the practical avocations—agricultural, commercial, or manufacturing—which will occupy so much of their subsequent attention. Whereas, had the time which most of them have thus wasted in classical studies been devoted to the acquisition of a basal knowledge of the physical and biological sciences, it may confidently be affirmed that the living interest which these subjects afford would lead to a desire for the extension of such knowledge, and that its possession could not but prove of definite advantage in their future career.

It is, however, constantly alleged by our pro-classical friends that whatever may be said for the teaching of science on utilitarian grounds the study of the classics has shown itself by long experience to have such inestimable advantages as an educational asset in the formation of character that it is not possible for any other branch of knowledge to take its place in the curricula of our schools and universities. This allegation must, in the absence of specific proofs, be met by us with the most absolute denial. The evidence we possess is indeed altogether on the opposite side. Of all the public services the one which is pre-eminent for the high character and efficiency of its officers is by universal consent the Royal Navy. And this is also distinguished from the rest by the fact that from the very first the training given is mainly a training in scientific methods, whilst the very subjects which are alleged by so many instructors of youth to be essential to a scheme of general education are rigorously excluded. We have here, in fact, an experiment in education which has been conducted on a large enough scale for us to draw definite conclusions from it, and I venture to say, without fear of contradiction, that the results are altogether in favour of the proposal to substitute science for classics in the schools and universities of this country.

Lastly, let us look for a moment at the sentimental side. More than one recent writer has argued as a proof of the efficiency of the existing system that if it is productive of no other benefit, the experience of the present war has shown that it has at least taught our boys how to die. The obvious answer to this appeal to sentiment is that the lesson has been just as well learned by those who have not passed under the classical yoke. Men of all classes of the community have done their duty equally bravely and unflinchingly. The courage and self-sacrifice which have been so abundantly displayed in our fighting Services and their auxiliaries cannot therefore be looked upon as the result of this or that system of education, but must be regarded as part of the common heritage of our race, of which we may all be justly proud. There is, besides, one thing which is of equal, or even greater importance than the knowledge of how to die, and that is the knowledge of how to live. Nevertheless, we are content to be ignorant of everything that pertains to our bodily life; ignorant of the functions of our organs, of their maintenance in health, of the evils which follow the abuse of those functions, of the relation of our bodies to their environment, of everything which tends to develop a healthy mind in a healthy body. True, many of us muddle through somehow in spite of this ignorance, but far too many suffer severely on account of it, and one of the benefits which will accrue from a diffused knowledge of science will be apparent in an enhanced interest in all questions affecting the health of the individual and the community. An educational curriculum which offers nothing beyond a little Greek and Latin must, by its very nature, produce an unfertile soil, permanently incapable of encouraging the growth of such knowledge as is of real value in the battle of life.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—An exhibition of 50*l.* a year, tenable for two years, is offered each year by the governing body of Emmanuel College to a research student commencing residence at Cambridge as a member of Emmanuel College in October. Applications, accompanied by two certificates of good character, should be sent to the Master of Emmanuel not later than September 24.

LONDON.—The report of the Vice-Chancellor on the work of the University during the year 1915–16 gives many interesting particulars as to the war work accomplished by the University. The total number of commissions granted to cadets and ex-cadets of the University Contingent of the Officers Training Corps since the outbreak of the war is 2031, and of com-

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missions granted to other graduates and students is 273. Honours and distinctions conferred include one Companionship of the Bath, one Victoria Cross, thirty Military Crosses, and seventy-eight Mentions in Despatches. Eighty-nine members of the contingent have fallen in the war. Returns received already from schools and institutions of the University show that upwards of 600 members of the staffs, and more than 6000 of their present and former students, have gone to the war. During the year the number of these who have given their lives has been 226. A large number of professors, demonstrators, and others, both teachers and students, are engaged in assisting the national authorities as chemists, physicists, engineers, and otherwise.

OXFORD.—The statute providing that original experimental investigation shall be a necessary condition for obtaining a class in the honour school of chemistry passed Convocation on May 16 without a division. This marks an important new departure in the regulation of chemical work at Oxford. It is hoped in many quarters that the principle thus established may be widely extended, so as to affect other scientific subjects besides chemistry.

The Halley Lecture for 1916 will be delivered in the Hall of Queen's College at 8.30 p.m. on Saturday, May 20, by Dr. G. W. Walker, late fellow of Trinity College, Cambridge. His subject is "The Measurement of Earthquakes."

SHEFFIELD.—Under the will of the late Mr. W. Edgar Allen, for many years chairman of Messrs. Edgar Allen and Company, Ltd., Imperial Steel Works, Sheffield, the sum of 32,000*l.* has just been paid to the University. Mr. Edgar Allen left estate of the gross value of 271,068*l.*, of which the net personalty was sworn at 251,792*l.* Among the numerous legacies for Sheffield institutions was the whole of his books for the University library, of which Mr. Allen was the donor. He also appointed the University one of the residuary legatees. Two-fifths of the residue of the property was to go to the University of Sheffield, one-fifth to Dr. Barnardo's Homes for general purposes, one-fifth to the Church Army for general purposes, and one-fifth to the Salvation Army for general purposes.

The 32,000*l.* mentioned is part of the residue of the estate, though when the distribution is completed the University will most likely receive further substantial proof of the late Mr. Allen's thoughtful generosity. The sum of 5000*l.* is intended by the will for the Applied Science Department of the University, and the balance is to go to University scholarships, half of the sum to be reserved for the sons of workingmen.

Sir Joseph Jonas, chairman of the Applied Science Committee, who has been a generous supporter of the University from the time of its inception, was a close friend of the late Mr. Allen, and he agreed to give 5000*l.* to the Applied Science Department, and this, with the sum left by Mr. Allen—10,000*l.* in all—will be devoted to the provision of materials-testing laboratories for the department, to be known respectively as "The Edgar Allen Physical Testing Laboratory" and "The Jonas Mechanical Testing Laboratory." In regard to any further amount which may still be received under Mr. Allen's will, this sum will be set aside for the provision of further scholarships.

SUMMER evening classes began at the Manchester Municipal School of Technology on May 15. From the prospectus, a copy of which has been received, we find that classes at low fees have been arranged in numerous branches of mechanical, electrical, municipal, and sanitary engineering, chemical technology, mining, the textile industries, and in some departments of pure science. That Manchester students are willing to devote themselves to evening study during the summer months is a satisfactory indication of their earnest intention to qualify themselves to take a worthy part in the international industrial competition of the future.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 11.—Sir J. J. Thomson, president, in the chair.—Major P. A. **Macmahon**: Seventh memoir on the partition of numbers. A detailed study of the enumeration of the partitions of multipartite numbers. Whereas a unipartite number m enumerates objects of the same species, a multipartite number m_1, m_2, m_3... may be regarded as numbering objects which involve similarities. The problem is the partition of a multipartite, or dividing up into sets of objects a given assemblage of objects, the division being subject to various governing conditions. The author showed long ago that the solution is implicitly contained in the algebra of symmetric functions. The difficulty has been in the evaluation of numerical coefficients which arise in the development of the symmetric function which presents itself as the solution for a particularly specified problem of partition. The discovery of the paper is principally that there exists a set of symmetric functions, $Q_1, Q_2, \ldots Q_i \ldots$ such that the effect of any one of the operations upon the product $Q_1^{k_1}, Q_2^{k_2}, \ldots Q_i^{k_i} \ldots$ is merely to multiply it by an easily ascertainable integer, combined with the circumstance that the symmetric function operand can be expanded in terms of such products. The result is that laws are obtained. It is established that under any given conditions enumeration in regard to a unipartite number m_s is given by the expression $\lambda a_s + \mu b_s + \nu c_s \ldots$ wherein λ μ, $\nu, \ldots$ are constants. Then the enumeration in regard to a multipartite number $m_1, m_2, \ldots m_s$ is given by

$$\lambda a_1 a_2 \ldots a_s + \mu b_1 b_2 \ldots b_s + \nu c_1 c_2 \ldots c_s + \ldots\ldots$$

It is therefore only necessary to obtain the unipartite solution in the form above given, when the multipartite solution at once follows. The set of functions Q can be modified to meet any specified conditions of partition. The complete solution of the problem of multipartite partition has thus been reached.—Lord **Rayleigh**: Legendre's function $P_n(\theta)$ when n is great and θ has any value. As is well known, an approximate formula for Legendre's function $P_n(\theta)$, when n is very large, was given by Laplace. The subject has been treated with great generality by Hobson, who has developed the complete series proceeding by descending powers of n, not only for P_n, but also for the "associated functions." The generality arrived at by Hobson requires the use of advanced mathematical methods. A simpler derivation, sufficient for practical purposes and more within the reach of physicists with a smaller mathematical equipment, may be useful. It had, indeed, been worked out independently. The series, of which Laplace's expression constitutes the first term, is arithmetically useful only when $n\theta$ is at least moderately large. On the other hand, when θ is small, P_n tends to identify itself with the Bessel's function, $J_0(n\theta)$, as was first remarked by Mehler. A further development of this approximation is here proposed. Finally, a comparison of the results of the two methods of approximation with the numbers calculated by A. Lodge for $n=20$ is exhibited.—Prof. A. **Dendy**: The occurrence of gelatinous spicules and their mode of origin in a new genus of siliceous sponges.

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