How much research has been undertaken by the student of pure science which he would have frankly admitted to be apparently useless? How much patient work and loving care have been bestowed upon investigations seemingly impossible of application to any of the specific problems of the day? Upon research of this kind no utilitarian would have been at all likely to embark, yet sooner or later such research has either proved capable of direct application or—and this has more often been the case—has unexpectedly formed a corner-stone, or occupied a more humble but still useful position, in building up some far-reaching generalisation capable of being seized upon at once by the worker in applied science, thus in turn perhaps stimulating further scientific research.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The subject proposed for the Adams prize essay for the period 1917–18 is "The Diffraction of Sound Waves." The solution of a typical problem or problems, such as that of diffraction by a circular or rectilinear aperture in a plane screen or by a circular disc, is desired free from approximations or restriction to relatively long waves. Treatment of the corresponding problems in electric waves is also suggested.

The question of compulsory Greek in the Previous examination has been very prominent during the present term. The case for the abolition of compulsory Greek has advanced greatly since 1905, when it was put to the vote and defeated. A syndicate appointed in 1913 to consider the regulations for the Previous examination reported that it was unable to recommend that Greek should continue to be a compulsory subject, and a new scheme was drawn up for the examination in which Greek was made alternative to French or German. Had it not been for the outbreak of war, this reform would probably by this time have become an accomplished fact, but, as it was, the discussion of the report was delayed until last year, and afterwards the syndicate expressed the opinion that it was inexpedient to bring the scheme before the Senate while so many members of the Senate were absent on war service.

Early in the present term the council of the Senate issued a report on the subject. The council agreed that it was inadvisable to proceed at once with the whole question of the reform of the Previous examination, since this should be considered together with the considerable modification and reconstruction of the educational system of the University which was likely to take place after the war; but it held that the question of Greek was of practical urgency at the present time, and it was of opinion that, as a temporary provision, the papers at present set in French and German (which are easier than those proposed by the syndicate) should be alternative to Greek. However, the council had ascertained that if a discussion were held and a vote taken in the existing circumstances, it would be greatly resented by some members of the Senate absent on war service, and it had accordingly decided not to take action at the present time. This aroused widespread disappointment in the University, and a memorial bearing a long and influential list of signatures was presented to the council asking it to reconsider its decision. A counter-memorial was presented; strong protests were also issued by a small number of residents now engaged on war service in various Government offices. The result has been that the council adheres to its decision to take no action at present, but the constitution of the Previous examination is to be considered further, so that it may be possible to take action immediately upon the conclusion of the war.

THE third conference of the Committee for the Development of Regional Survey will be held at Newbury on April 7–17, and it is proposed to make a detailed study of the town and region. No formal classes will be held or lectures given, but there will be daily conferences for the purposes of study. The committee hopes that sufficient workers will be able to attend the conference to make all aspects of the regional survey possible, physical, historical, and social. Members are asked to communicate with the hon. local secretary, Kingsbridge Road, Newbury.

THE governors of the Imperial College of Science and Technology have recently considered the conditions to be fulfilled in the case of students of the Royal School of Mines whose associateship courses of study have been interrupted by their undertaking service with the Forces of the Crown or other approved war-work, precedent to the award to them of the diploma of associateship of the Royal School of Mines in Mining or in Metallurgy or in Oil Technology. Instead of insisting upon the full four-year course, the opportunity is offered for a student to complete in three years the tests ordinarily imposed, having regard to experience gained during the war, and, in that case, the reduction is contemplated of the requirement as regards practical work (shifts) by one-third, and the possibility of a man making good in certain arrears of subjects during vacations, but it is considered inadvisable to make any curtailment of the work of the first and second years.

AT a representative and largely attended conference of examining bodies in Great Britain held on March 15 at the Board of Education under the presidency of Mr. A. T. Davies, chairman of the British Prisoners of War Book Scheme (Educational), it was unanimously decided, on the motion of Sir Edward Busk (University of London), to approve certain proposals for the encouragement and recognition of the studies pursued by prisoners during their internment. Steps are being taken to give effect to these proposals, and various examining bodies (including most of the universities) have already intimated their willingness to recognise work done and examinations passed in the camps, and to extend to the men on their return facilities for sitting for examinations under conditions which will take account both of their special circumstances and their needs. A message was read from the President of the Board of Education in which Mr. Fisher expressed sympathy with the objects of the conference and his belief that the result of its efforts would prove a great encouragement to the men to use wisely and well the time of their captivity, and, further, would be of material assistance to them on their return to this country. It is intended that the decision arrived at shall be communicated, as soon as possible, as "a message of encouragement and hope" to the various internment camps in enemy and neutral countries. In the meantime it was suggested that friends and relatives of student prisoners might do them a service if, when writing to them, they will direct their attention to the steps in this connection which are being taken on their behalf.

THE issue of the Journal of the Royal Society of Arts for March 9 contains a paper on "German Methods" by Mr. J. H. Vickery, read before the society on March 7. In it Mr. Vickery deals, among other matters, with German education and science. He points out that it is the habit of the Germans to refer to the English as being a "practical" people. But he urges that, in point of fact, the German has

been much more practical in the matter of turning scientific knowledge to account. "With all his boasted idealism he has long since ceased to follow scientific research purely and solely for the love of the thing." He "has been taught that if science possesses any practical value it would be an unpardonable violation of an economic law to allow that value to go unexploited. As a result the university and Government laboratories are closely linked up with the factories and workshops of the nation." Scientific achievement both in theory and in practice receives higher recognition in Germany than in any other country. That commercial and industrial use is made of the achievements of science has not lowered the tone of the German man of science, but has raised the tone of German industries. In Germany, says Mr. Vickery, "not merely one man as a voice crying in the wilderness, but a thousand voices, from the Kaiser downwards, have been crying in chorus—*Think scientifically, act scientifically.*' There is no need, he thinks, for us to copy German methods, for if we once recognise the underlying truths of scientific development, both in theory and in practice, we shall be able to work out the methods of fruitfully applying the discoveries of science.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 8.—Sir J. J. Thomson, president, in the chair.—W. B. **Bottomley**: Some effects of growth-promoting substances (auximones) on the growth of *Lemna minor* in culture solutions. 1. Raw peat, when further decomposed by means of aerobic soil organisms—"bacterised peat"—is found to contain certain growth-promoting substances (auximones). 2. *Lemna minor* plants cannot maintain growth for any length of time in culture solutions containing only mineral nutrients. 3. The presence of soluble organic matter is essential for complete growth. 4. The addition to the mineral culture solution of 368 parts per million of organic matter from the water extract of bacterised peat resulted, after six weeks, in a multiplication of the number to 20 times, and an increase in weight to 62 times, that of the control plants. The water extract free from humic acid, representing an addition of 97 parts of organic matter per million, gave $9\frac{1}{2}$ times the number and 29 times the weight; 32 parts per million from the alcoholic extract gave $3\frac{1}{3}$ times the number and $7\frac{1}{3}$ times the weight; 13 parts per million from the phosphotungstic fraction gave $1\frac{1}{2}$ times the number and $2\frac{1}{2}$ times the weight. 5. The effect of the reduction in amount of auximones with successive fractionation of the bacterised peat was also manifest from the general appearance of the plants. Those in mineral nutrients only, decreased in size week by week, and became very unhealthy in appearance, whilst there was a progressive improvement in the appearance of the plants supplied with increasing amounts of auximones. Those receiving the larger amounts retained their normal healthy appearance throughout the experiment and increased in size. 6. The beneficial effect of the auximones was not due to a neutralisation of the toxic substances present in the ordinary distilled water, since comparable results were obtained with conductivity water. 7. An interchange of culture solutions, with and without auximones, showed that the plants are very sensitive to the presence or absence of these substances. —Florence A. **Mockeridge**: Some effects of growth-promoting substances (auximones) on the soil organisms concerned in the nitrogen cycle. This investigation deals with the effect of bacterised peat and the various auximone-fractions obtained from it upon the four chief groups of soil bacteria concerned in the nitrogen cycle, *in situ*, and in liquid culture. The addition of bacterised peat to soil increased the rate of nitrogen fixation quite independently of any bacteria contained in the material. This increase was not due to aeration, nor could it be brought about by chemically treated peat. Experiments in liquid culture showed that a water extract of this material greatly increased the nitrogen fixation of Azotobacter and of *Bacillus radicicola*. An alcoholic extract and the decomposed phosphotungstic acid and silver baryta fractions from it were also very effective. Similar results could not be obtained with chemically prepared soluble humus or with artificial humus. The accumulation of nitrate in soil containing bacterised peat was greater than that which could be accounted for by the soluble nitrogen which it contained, and took place more rapidly than in a similar soil provided with an equal amount of soluble nitrogen as ammonium sulphate. Since the water extract of the material was found to be directly nitrifiable, its effect upon the rate of nitrification was not tested, but the auximone-fractions, which were not nitrifiable, greatly increased the rate of nitrification of ammonium sulphate solutions. The auximone-fractions were without effect upon the rate of ammonification in soils and upon the ammoniacal fermentation of urea. The water extract had no effect upon the rate of denitrification, but the auximone-fractions directly inhibited the process. The work indicates that certain decomposition products of organic matter stimulate the activities of certain soil bacteria, and appear to play an important part in nitrogen metabolism.

Physical Society, February 9.—Prof. C. V. Boys, president, in the chair.—Dr. A. **Griffiths**: Note on the calculation of the coefficient of diffusion of a salt at a definite concentration. In the calculation of the coefficient of diffusion, by B. W. Clack, a simple relation is assumed between the density of a solution of a salt and the concentration. This simple relation is only approximately correct, and compromises are made which require justification. This note (1) suggests a method of calculating the coefficient of diffusion which, to a high degree of theoretical accuracy, gives values for the coefficient which are independent of a precise relationship between density and concentration; and (2) justifies the method of calculation adopted by B. W. Clack.—Dr. P. E. **Shaw** and C. **Hayes**: A special test on the gravitation temperature effect. In the Philosophical Transactions of the Royal Society, vol. ccxvi., pp. 349-92, there is a paper by one of the authors dealing with the possible existence of a temperature coefficient of the constant of gravitation. It was suggested in the discussion that the effect might be due to an inward displacement of the large lead spheres, at the higher temperatures, due to convection currents. In the present paper experiments are described in which this point is tested by micrometric measurements of the positions of the supporting wires. It is shown that, at the higher temperatures, there is a small *outward* displacement of the spheres, probably due to the expansion of the crosshead from which they are suspended. A slightly *higher* value has, therefore, to be given to the temperature coefficient of gravitation.

Geological Society, February 16.—Annual general meeting.—Dr. Alfred Harker, president, in the chair. —Dr. A. **Harker**: Anniversary address. Some aspects of igneous action in Britain, especially its relation to crustal stress and displacement. This relation appears not only in the distribution of igneous activity in time and space, in the succession of episodes, the habits of intrusions, etc., but also in the petrographi-