points out, this is merely an alleviation, and the only satisfactory method is that which goes to the root of the trouble and removes the salt accumulation entirely by efficient drainage. BRYSSON CUNNINGHAM.

ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

THE anniversary meeting of the Royal Society was held on Friday last, November 30, when the council and officers whose names were given in NATURE of November 8 (p. 190) were elected. The annual report of the council was adopted, and the president, Sir J. J. Thomson, delivered his address. Subjoined are a summary of some of the main points in the report of the council, and an abridgment of the president's address.

Report of the Council.

The report of the council records that shortly after the entry of the United States into the war the Royal Society received the following cable message from the National Academy of Sciences at Washington:—

"The entrance of the United States into the war unites our men of science with yours in a common cause. The National Academy of Sciences, acting through the National Research Council, which has been designated by President Wilson and the Council of National Defence to mobilise the research facilities of the country, would gladly co-operate in any scientific researches still underlying the solution of military or industrial problems."

The following reply was dispatched:—

"The Royal Society heartily welcomes the offer of the National Academy to co-operate in scientific researches connected with the war, and will communicate by letter proposals for carrying this into effect."

Steps have been taken by the society to carry the proposed co-operation into effect in connection with the Admiralty, the Ministry of Munitions, and the Department of Scientific and Industrial Research. Experiments on a large scale have been undertaken by the U.S. National Research Council to determine the effect of variations in the milling standard, and in the nature of the cereals employed, upon the digestibility of bread; and parallel investigations are in progress in this country.

Reference is made to the transfer of the National Physical Laboratory to the Department of Scientific and Industrial Research. The scientific control of the laboratory will continue to be exercised by the president and council of the Royal Society, as in the original scheme, but the financial responsibility will be assumed by the Committee of the Privy Council for Scientific and Industrial Research. A working arrangement has been arrived at between the Advisory Council of this body and the Government Grant Committee of the Royal Society by which the society is to inform the council of applications received for sums of money out of the Government grant, and the council is to refer to the society any applications received by it which may be more suitably dealt with by the society than by the council. It is not clear whether this arrangement accounts for the fact that though applications for grants amounting to 5381*l.* were received by the Government Grant Committee, the ordinary grants made amounted to only 1295*l.* The grants made in 1915 amounted to 3344*l.*, and in 1916 to 2482*l.*

The reduction of the magnetic survey of the British Isles was completed in the early part of this year. The important and simple result has been obtained that "formulæ for the geographical components of magnetic force, which are linear in the differences of latitude and longitude all over the British Isles, and satisfy the condition for a potential, give as close a representation of the main features as the more elaborate and empirical expressions obtained by Rücker and Thorpe." Accordingly "disturbances" are defined as the differences between the observed values and those calculated from this potential. Direct comparison of the primary observations in the two surveys has been made, and shows that, with few exceptions, the secular change is remarkably uniform in the various districts. The mean annual change for these islands generally has been in $H+13{\cdot}2\gamma$, in $D-6{\cdot}1'$, and in $I-1{\cdot}2'$. The annual change in H and I has been distinctly less in the north, but the change in D is practically constant all over. The disturbing forces in the two surveys are also in good general agreement, although the differences, which are chiefly in the vertical component, suggest a modified view of "ridge" lines. The two surveys, however, prove that these disturbances are not mere errors of observation, but are due to regional and local causes. That they arise from magnetic material (presumably iron) seems undoubted, and the only questions are whether this material is concentrated locally or disseminated widely, and whether it is near the surface or deeply seated. The possible economic importance of this led to the appointment of an Iron Ore Committee, to consider whether magnetic observations might be of assistance in locating iron ore. A more detailed survey of the Melton district was made by Mr. G. W. Walker this autumn, by aid of a grant from the society, and this is being followed up by a petrological survey under the director of the Geological Survey.

The possibility of introducing a more convenient system of timekeeping at sea has lately been under consideration, both in this country and in France. The conclusions reached at a conference under the chairmanship of the Hydrographer to the Admiralty, in which representatives of scientific societies took part, are included in the report of the council. The most practical method of obtaining uniformity is considered to be the establishment, outside territorial waters, of zones corresponding with the hourly zones on land. It is proposed that the zone extending from $7\frac{1}{2}°$ east to $7\frac{1}{2}°$ west of Greenwich should be the zero zone, and that the other zones west and east should be respectively described as *plus* or *minus*, with an indication of the actual correction required for reduction to Greenwich time and date. On this system $+12$ would be the half-zone east of the "date line," and -12 the half-zone west. Any alteration of the time of clocks in ships should always be one hour, but the instant of making the change need not necessarily be that of passing to a new zone. In the case of self-recording meteorological instruments, which it would be difficult to adjust for changing zone time, Greenwich time is considered most convenient, but ship's time should be used for the regular observations. If the proposed zone times be generally adopted, it is recommended that the receipt and dispatch of telegraphic and other messages should for the immediate future be recorded in zone time; but, eventually, it would be most convenient for such purposes to adopt Greenwich time throughout the world.

Presidential Address.

The extent to which men of science in this country are engaged on investigations connected with the war is scarcely realised, except by those who have to try to find the men for any new piece of work of this kind which may have to be put in hand. It is a matter of the greatest difficulty to find any competent person who is not already engaged on such work. Professors from our Colonies have come back to help at home, and in some cases have brought their demonstrators

and senior students with them. The importance of having an ample supply of trained scientific workers, and the necessity for this country to increase its supply in the future, could scarcely be proved more incisively than by our experience in this connection.

The need for a greater appreciation of the value of science has been brought into such prominence by the war that most of those who have advocated the claims of science in education have not unnaturally laid the greatest stress on the importance of science to the welfare, the power, and even the safety of the nation. The supporters of literary studies have, on the other hand, dwelt mainly on the fact that literature broadens a man's horizon, and gives him new interests and pleasures, that it teaches him how to live, if not how to make a living. The result of this divergence of appeal has made the discussion appear, to those who watch it from outside, almost like a discussion between spirituality and materialism, or between a saint and a man of business.

Echoes of this sentiment are to be found in the opinions expressed by some members of the Labour Party; there is a tendency to regard science teaching with suspicion, as being intended to make the working man more valuable to his employer rather than to increase the brightness and interest of his own life.

I recognise—and I know no man of science who does not—the necessity of literary studies as a part of the education of every boy and girl, but I must protest against the idea that literature has a monopoly in the mental development of the individual. The study of science widens the horizon of his intellectual activities, and helps him to appreciate the beauty and mystery which surround him. It opens up avenues of constant appeal to his intellect, to his imagination, to his spirit of inquiry, to his love for truth. So far from being entirely utilitarian, it often lends romance and interest to things which to those ignorant of science make no appeal to the intellect or imagination, but are regarded by them from an exclusively utilitarian point of view. A knowledge of science brightens and widens the intellectual life, and is a constant stimulus to the intellect and imagination.

The question of the position of science in schools is of vital importance; I think that we ought also to pay attention to the need for sustaining and stimulating in after-life the interest in science which we hope will have been aroused at school. We should encourage and develop efforts to bring to the notice of the public those results of science which are of general interest. I am not sure that we do all that is possible in this direction, and yet it seems our duty to the community to give it everything which can add interest to life and stimulate the intelligence; to do everything in our power to increase appreciation and interest in science among our citizens; without such appreciation, a full utilisation of the resources of science and adequate encouragement for its development are impossible in a democratic country.

There are many results of general interest embodied in papers which could not be read by anyone who was not a specialist in the subject. I will give one instance, taken from what might seem a somewhat unpromising branch of science—arithmetic. If we take the numbers in order 1, 2, 3, . . . we see that there are some, such as 3, 5, 7, 11, which cannot be divided by any number smaller than themselves; these are called prime numbers; the number of such primes which are less than a given number is a matter of very considerable importance, and Gauss, many years ago, gave, without any rigorous proof, a rule about it. The rule was tested by actual trial for numbers up to a thousand millions, and, as it was found to be true over that immense range, it was accepted as universally correct in spite of the absence of a satisfactory proof. Quite recently, however, Mr. Littlewood, one of our fellows, has shown that, in spite of this apparently overwhelming evidence in its favour, the result is not general, but the numbers, for which it breaks down, are so enormous that it would be quite beyond the powers of human endurance to detect its failure by actual trial. I may say, in passing, that, enormous as these numbers are, they are mere nothings compared with what we have to deal with in many branches of physics. Here, then, we have a result which has satisfied, and apparently always will satisfy, any direct test that can be applied to it, and yet is not generally true; there seems to me to be something of a tragedy, perhaps the suspicion of a sermon, in this investigation, which is in a paper of a highly technical character, quite unintelligible to anyone who was not an expert mathematician.

There are many results of this kind, known only to specialists, but which would interest a very much wider circle of readers if they could be brought to their notice. Unfortunately, there does not seem to be at present any recognised method of doing this. There are excellent periodicals with special circles of readers which might find a place for some of them, but these only reach a minute fraction of the educated public. There is room, I think, for a periodical which would appeal to a much wider circle, which should contain interesting and trustworthy accounts of results of interest, not only in science, but also in the other subjects included in a general education.

The desirability of a journal of this kind was recently brought before the notice of the Executive Committee of the Conjoint Board of Scientific Societies. If it could be established, it would, I believe, do good work by stimulating the intellectual life of the nation and increasing the appreciation of science throughout the country.

The Medallists.

COPLEY MEDAL.—M. Emile Roux, Pasteur's chief collaborator, succeeded him as the director of the Institut Pasteur, which he has successfully developed and maintained as the foremost school of bacteriology, both for teaching and for research. From the early 'eighties, when he was associated with Pasteur and Chamberland in the study of anthrax and the production of vaccines against this disease, he has played a leading part in the development of our knowledge of the processes of immunity. His work with the distinguished veterinarian Nocard upon the contagious pleuro-pneumonia of cattle was the first demonstration of the existence of "ultra-microscopic," or, as they are now termed, filterable viruses as disease-producing agencies; his work with Yersin, the first full study of the bacillus of diphtheria and of its toxins. He shares with the late Prof. Behring, of Marburg, in the introduction of diphtheria antitoxin as a practical means of prophylaxis and cure, and with him as co-founder of serum therapeutics was awarded the Nobel prize. All the leading French bacteriologists of our generation have been his pupils.

ROYAL MEDALS.—Dr. Aitken is distinguished for his lifelong researches on the nuclei of cloudy condensation, embodied in a series of memoirs communicated to the Royal Society of Edinburgh. The latest of these appeared in the present year. Dr. Aitken's discoveries opened up a new field of investigation in physics, and constitute a chapter of knowledge of great importance intrinsically and in their relation to the physics of meteorology. Dr. Aitken, who has pursued his work as an amateur, has displayed great experimental ingenuity, and his remarkable construction of the "dust-counter" has provided a permanent scientific appurtenance of precision to the physicist and

climatologist. Among other contributions to science, Dr. Aitken has made important advances in our knowledge of the formation of dew.

Dr. Smith Woodward has been for many years keeper of the Department of Geology in the British Museum, and has published a very large number of valuable memoirs on fossil vertebrates, especially fishes. He has also published an important "Catalogue of Fossil Fishes in the British Museum," and his "Outlines of Vertebrate Palæontology," published in 1898, is a standard text-book on the subject. Dr. Smith Woodward's original memoirs are too numerous to mention, but they have secured for him a world-wide reputation, and he is universally regarded as one of the highest authorities on vertebrate palæontology.

DAVY MEDAL.—M. Albin Haller, professor of organic chemistry at the Sorbonne, Paris, founder and first president of the International Association of Chemical Societies, and at the present time the most representative chemist of France, is distinguished for his many and important contributions to chemical science during the past forty years. His investigations have covered a very wide field in the domain of organic chemistry, the most important being those dealing with compounds belonging to the camphor group. He has maintained over a long period of years the reputation of the Sorbonne School of Chemical Research, created by Dumas and Wurtz, his predecessors in the chair.

BUCHANAN MEDAL.—Sir Almroth Edward Wright was the first (1896) to apply laboratory knowledge on typhoid immunity to the protection of human beings against enteric fever. Against formidable opposition he carried out a long series of observations with the highest scientific acumen and unsurpassed technique, and laid the foundations for the effective elimination of enteric fever from the armies of the world. Nothing of importance has been added to his work down to the present time.

HUGHES MEDAL.—Prof. C. G. Barkla's investigations have mainly dealt with X-rays, and their absorption and secondary emission by solid substances. He showed that secondary emission of X-rays was of two varieties. In one of these the X-rays are scattered, without change of quality. The scattered rays were shown by examining tertiary emission to be polarised, and this was a fundamental result for the classification of X-rays with ordinary radiation, at that time doubtful. Prof. Barkla's other kind of secondary emission is characteristic of the secondary radiator, and is accompanied by selective absorption of the primary rays. He showed that each chemical element emitted more than one definite kind of secondary fluorescent radiation. Concentrating attention on, say, the less penetrating kind, it was found to vary in quality by definite steps with the atomic weight of the secondary radiator.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The Romanes lectures, which has been in abeyance for the present year, will, it is hoped, be delivered in the course of 1918. The lecturer appointed by the Vice-Chancellor is the Rt. Hon. H. H. Asquith, D.C.L., honorary fellow of Balliol College. The subject and date are not yet announced.

A BEQUEST of 10,000*l.* has been made to the University of Liverpool by Mrs. A. C. Chaddock for the endowment of a chair of commerce in memory of her husband, unless such a chair has been endowed already, in which case the bequest is to be used for such purposes as the authorities shall determine.

THE provision of excellent laboratories at the Bristol Grammar School was followed in 1915 by the formation of a Scientific Society, which now issues its first report. The society is made up of the science masters and science students, members of the classical side and the upper school being admitted under special rules. The society gives the members special opportunities for developing their school studies along lines of their own choosing, subject to the approval of the master in charge, and work of this character is expected from the members during meeting hours. A strong library has been formed, and the nucleus of a local herbarium, to which the members have contributed 350 species. War difficulties and lighting regulations have somewhat hindered the holding of working meetings, their place being taken by lectures, to which the upper and middle schools were admitted.

AT the Massachusetts Institute of Technology the faculty changes have introduced some new problems, since there has been so much demand by the U.S. Government and by industrial corporations related to the war for men of technical skill. So great has been this draft, says *Science*, that in the department of electrical engineering one-third of the staff has been called away, in mechanical engineering a dozen men have gone into war work, while civil engineering, chemistry, naval architecture, and the other departments have sustained serious losses. On the other hand, the demands for instruction have not only not decreased, for the registration is but slightly less than normal with much the same distribution through courses, but are to a considerable extent greater, for the institute is furnishing instruction on academic and engineering lines to the schools of aeronautics for the Army and Navy, and is carrying on no fewer than three schools for deck officers and the school for marine engineers. Changes already announced include the retirement of Prof. C. R. Cross, with the title of professor emeritus, and the appointment of Prof. E. B. Wilson, of the department of mathematics, to the chair of mathematical physics and head of the department of physics. Prof. C. L. Norton has been appointed professor of industrial physics. In the department of chemical engineering of the University of Michigan all but one member of the faculty have left for active service. Every effort made by the University to replace them temporarily proved unavailing, owing to the unprecedented demand for men in this branch. The situation became so acute that several manufacturing concerns of the State, which employ expert chemical engineers, and the Michigan Agricultural College, came to the aid of the University, and it opened with a complete staff in this department. Dr. C. D. Holley, of the White Lead and Colour Works, of Detroit, will act as head of the department during the absence of Prof. A. H. White.

SOCIETIES AND ACADEMIES.

LONDON.

Zoological Society, November 20.—Mr. E. G. B. Meade-Waldo, vice-president, in the chair.—J. J. **Joicey** and G. **Talbot**: New South American Rhopalocera, New South American Arctiidæ, new butterflies from Africa and the East, Gynandromorph of *Papilio lycophron*, Hbn., and three aberrations of Lepidoptera.—S. **Alphéraky**: Deformity of *os penis* in a *Phoca caspica*, Nilsson.—Lt.-Col. J. M. **Fawcett**: Notes on a collection of Heterocera made by Mr. W. Feather in British East Africa, 1911–13.—Prof. F. W. **Jones**: The structure of the orbito-temporal region of the skull of Lemur.

Geological Society, November 21.—Dr. Alfred Harker, president, in the chair.—J. **Morrison**: The Shap minor intrusions. The paper deals with the minor igneous intrusions occurring in the triangular area between